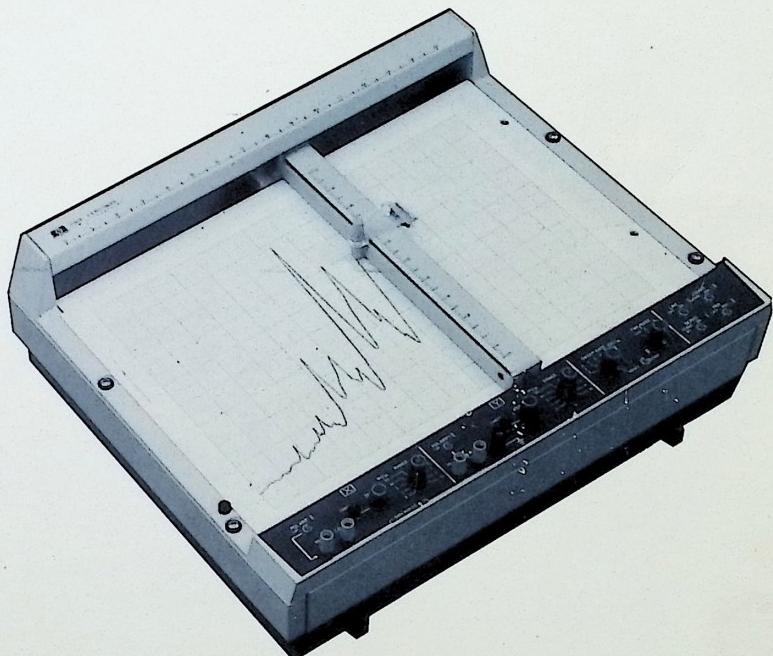


# X-Y RECORDER

## 7044A/7045A



MAGNETIC ANALYSIS CORP.  
28998 Freeway Park Dr.  
Farmington, Mich. 48324

313-278-0020

HEWLETT  PACKARD

Model No.  
**1099A**

Serial No.  
**1701**

Inspected by:

Date:

**11600 MAR 15 1976**

#### CERTIFICATION

The Hewlett-Packard Company certifies that this instrument was thoroughly tested and inspected and found to meet its published specifications when it was shipped from the factory. The Hewlett-Packard Company further certifies that its calibration measurements are traceable to the U.S. National Bureau of Standards to the extent allowed by the Bureau's calibration facility.

#### WARRANTY AND ASSISTANCE

All Hewlett-Packard products are warranted against defects in materials and workmanship. This warranty applies for one year from the date of delivery, or, in the case of certain major components listed in the operating manual, for the specified period. We will repair or replace products which prove to be defective during the warranty period provided they are returned to Hewlett-Packard. No other warranty is expressed or implied. We are not liable for consequential damages. Service contracts or customer assistance agreements are available for Hewlett-Packard products that require maintenance and repair on-site. For any assistance, contact your nearest Hewlett-Packard Sales and Service Office. Addresses are provided at the back of this manual.

#### IMPORTANT

You can substantially assist our efforts in maintaining this insured quality by checking the appropriate box on the return card and making any comments you would like to make.

*Hewlett-Packard Company certifies that this instrument was tested and inspected and found to meet its published specifications when it was shipped from the factory. The Hewlett-Packard Company further certifies that its calibration measurements are traceable to the U.S. National Bureau of Standards to the extent allowed by the Bureau's calibration facility.*

## CERTIFICATION

*Hewlett-Packard Company certifies that this instrument was tested and inspected and found to meet its published specifications when it was shipped from the factory. The Hewlett-*

*Packard Company further certifies that its calibration measurements are traceable to the U.S. National Bureau of Standards to the extent allowed by the Bureau's calibration facility.*

## WARRANTY AND ASSISTANCE

All Hewlett-Packard products are warranted against defects in materials and workmanship. This warranty applies for one year from the date of delivery, or, in the case of certain major components listed in the operating manual, for the specified period. We will repair or replace products which prove to be defective during the warranty period provided they are returned to Hewlett-Packard. No other warranty is expressed or implied. We are not liable for consequential damages.

Service contracts or customer assistance agreements are available for Hewlett-Packard products that require maintenance and repair on-site.

For any assistance, contact your nearest Hewlett-Packard Sales and Service Office. Addresses are provided at the back of this manual.

- HEWLETT  PACKARD -



# OPERATING AND SERVICE MANUAL

## 7044A/7045A X-Y RECORDER

SERIAL PREFIX: 1220A

This Operating and Service Manual applies to HP Model 7044A/7045A X-Y Recorders having Serial Prefix 1220A.

Copyright            HEWLETT-PACKARD            1972  
16399 W. BERNARDO DRIVE, SAN DIEGO, CALIFORNIA 92127

07044-90000

Printed: MAY 1972



## TABLE OF CONTENTS

Section	Page	Section	Page
I    INTRODUCTION .....	1-1	3-28    Set Vernier Control .....	3-3
1-1    Description .....	1-1	3-30    Connect Inputs .....	3-3
1-2    Basic Frame .....	1-1	3-32    Zero Set .....	3-3
1-4    Model-Manual Information .....	1-1	3-34    Lower Pen .....	3-3
1-6    Specifications .....	1-1		
1-8    Options .....	1-1		
1-10    Time Base – Option 001 .....	1-1	IV    THEORY OF OPERATION .....	4-1
1-12    Event Marker – Electric – Option 002 .....	1-1	4-1    General .....	4-1
1-14    X-Axis Retransmitting Potentiometer – Option 003 .....	1-4	4-2    Purpose .....	4-1
1-16    Y-Axis Retransmitting Potentiometer – Option 004 .....	1-4	4-4    Circuit Description .....	4-1
1-18    TTL Remote Control – Option 005 .....	1-4	4-5    Preamplifier (X and Y Axes) .....	4-1
1-20    Metric Scaling – Option 006 .....	1-4	4-7    Slidewire Buffer Amplifier (X and Y Axes) .....	4-1
1-22    Rear Connector – Option 007 .....	1-4	4-9    Servo Amplifier (X and Y Axes) .....	4-1
1-24    Accessories .....	1-4	4-11    Polarity Switch (X and Y Axes) .....	4-1
II    INSPECTION AND INSTALLATION .....	2-1	4-13    Phasing Amplifier (7045A – Y-Axis) .....	4-2
2-1    Introduction .....	2-1	4-15    Limit Switches (7045A Y-Axis) .....	4-2
2-3    Incoming Inspection .....	2-1	4-17    Circuit Description – Options .....	4-2
2-4    Mechanical Checks .....	2-1	4-18    Time Base – Option 001 .....	4-2
2-6    Electrical Checks .....	2-1		
2-8    Damage Claims .....	2-1		
2-10    Storage .....	2-1	V    MAINTENANCE, PERFORMANCE CHECKS, AND ADJUSTMENTS .....	5-1
2-12    Shipping .....	2-1	5-1    Introduction .....	5-1
2-14    Recorder Installation .....	2-1	5-3    Preventive Maintenance .....	5-1
2-15    Mechanical Installation .....	2-1	5-4    General .....	5-1
2-17    Cooling .....	2-2	5-6    Environmental Operation .....	5-1
2-19    Option Installation/Conversion .....	2-2	5-8    Cleaning .....	5-1
2-21    Event Marker – Option 002 .....	2-2	5-10    Potentiometer Cleaning .....	5-1
2-23    X-Axis Retransmitting Potentiometer – Option 003 .....	2-2	5-12    Lubrication .....	5-2
2-25    TTL Remote Control – Option 005 .....	2-2	5-14    Visual Inspection and Mechanical Freedom Test .....	5-2
III    OPERATING INSTRUCTIONS .....	3-1	5-16    Mechanical Maintenance .....	5-3
3-1    Operating Requirements .....	3-1	5-17    Disassembly/Assembly .....	5-3
3-2    General .....	3-1	5-19    X-Axis Potentiometer Replacement .....	5-3
3-4    Controls, Connectors, and Indicators .....	3-1	5-21    X-Axis Wiper Replacement .....	5-3
3-6    Electrical Requirements .....	3-1	5-23    Y-Axis Potentiometer Replacement .....	5-4
3-7    Operating Power .....	3-1	5-25    Y-Axis Wiper Replacement .....	5-4
3-9    Input Signals .....	3-1	5-27    X-Axis Drive Gear Replacement .....	5-5
3-11    Grounding .....	3-1	5-29    Servo Motor Maintenance .....	5-5
3-13    Operating Precautions .....	3-1	5-31    Y-Axis Restrunging .....	5-6
3-14    Servo .....	3-1	5-33    7044A X-Axis Restrunging .....	5-6
3-17    Response Switch .....	3-1	5-34    7045A X-Axis Restrunging .....	5-8
3-19    Operating Instructions .....	3-1	5-35    Electrical Maintenance .....	5-8
3-20    Connect Power .....	3-1	5-36    Requirements .....	5-8
3-22    Energize Recorder .....	3-1	5-38    Performance Tests .....	5-8
3-24    Install Paper .....	3-1	5-39    Criteria .....	5-8
3-26    Install Pen .....	3-3	5-41    Test Equipment .....	5-8

## TABLE OF CONTENTS (Continued)

Section	Page	Section	Page
5-49      X-Axis Accuracy and Linearity . . . . .	5-10	5-90      Electrical Adjustments . . . . .	5-16
5-51      Input Resistnace . . . . .	5-10	5-91      Calibration Adjustment . . . . .	5-16
5-53      Y-Axis Slewing Speed . . . . .	5-11	5-93      Input Offset Adjustment . . . . .	5-17
5-55      X-Axis Slewing Speed . . . . .	5-11	5-95      Gain Adjustment . . . . .	5-17
5-57      Common Mode Rejection . . . . .	5-12	5-97      Time Base Calibration Adjustment . . . . .	5-17
5-60      Overshoot . . . . .	5-13	5-100     Y-Axis Limit Switch Adjustment - 7045A . . . . .	5-19
5-63      Time Base - Option 001 . . . . .	5-13		
5-65      Event Marker - Option 002 . . . . .	5-13		
5-67      X-Axis Retransmitting Potentiometer - Option 003 . . . . .	5-14		
5-69      Y-Axis Retransmitting Potentiometer - Option 004 . . . . .	5-14		
5-71      TTL - Option 005 . . . . .	5-14		
5-73      Mechanical Adjustments . . . . .	5-14		
5-74      Procedure . . . . .	5-14		
5-76      Y-Axis Drive String Tension . . . . .	5-14		
5-78      X-Axis Cable Tension Adjustment . . . . .	5-15		
5-80      Y Gear Train Backlash Adjustment . . . . .	5-15		
5-82      X Gear Train Backlash . . . . .	5-15		
5-84      X-Axis Alignment Adjustment . . . . .	5-15		
5-86      Y-Axis Alignment Adjustment . . . . .	5-16		
5-88      Pen Lift Adjustment . . . . .	5-16		
		VI      PARTS LIST . . . . .	6-1
		6-1      Introduction . . . . .	6-1
		6-3      Parts List . . . . .	6-1
		6-4      Alphanumerical Table . . . . .	6-1
		6-6      Miscellaneous Parts . . . . .	6-1
		6-8      Code List of Manufacturers . . . . .	6-1
		6-10     Illustrated Parts Breakdown . . . . .	6-1
		6-12     Recommended Spares . . . . .	6-1
		6-14     Ordering Information . . . . .	6-1
		VII     TROUBLESHOOTING . . . . .	7-1
		7-1      Introduction . . . . .	7-1
		7-2      Content . . . . .	7-1
		7-4      Troubleshooting . . . . .	7-1
		7-5      Requirements . . . . .	7-1
		7-7      Troubleshooting Index . . . . .	7-1

## LIST OF ILLUSTRATIONS

Figure	Page	Figure	Page		
1-1	Model 7044A X-Y Recorder . . . . .	1-0	5-13	Y-Axis Slewing Speed – 7044A and 7045A Models . . . . .	5-12
1-2	Model 7045A X-Y Recorder . . . . .	1-0	5-14	X-Axis Slewing Speed – 7044A and 7045A Models . . . . .	5-12
1-3	Instrument Identification . . . . .	1-1	5-15	Overshoot Test Setup . . . . .	5-13
1-4	Model 7044A/7045A Dimension Drawing .	1-3	5-16	X-Axis Cable Tension Check . . . . .	5-15
1-5	Time Base – Option 001 . . . . .	1-3	5-17	X-Axis Alignment Adjustment . . . . .	5-16
1-6	Event Marker – Option 002 . . . . .	1-4	5-18	Y-Axis Alignment Adjustment . . . . .	5-16
1-7	X-Axis Retransmitting Potentiometer – Option 003 . . . . .	1-4	5-19	Calibration Adjustment . . . . .	5-17
1-8	Y-Axis Retransmitting Potentiometer – Option 004 . . . . .	1-4	6-1	Main Frame – Model 7044A . . . . .	6-2
2-1	Recorder Installation . . . . .	2-1	6-2	Control Panel – Model 7044A . . . . .	6-18
2-2	TTL Remote Control Installation . . . . .	2-2	6-3	Main Frame – Model 7045A . . . . .	6-20
3-1	Control Panel – 7044A and 7045A . . . . .	3-2	6-4	Control Panel – Model 7045A . . . . .	6-36
3-2	Rear Panel . . . . .	3-3	7-1	Power Supply Circuit Board – 7044A/7045A . . . . .	7-2
3-3	Rear Connector – Option 007 . . . . .	3-4	7-2	Power Supply Schematic – 7044A/7045A . . . . .	7-3
4-1	Model 7044A X and Y Axes/7045A X Axis Simplified Block Diagram . . . . .	4-1	7-3	X-Axis DC Amplifier Circuit Board – 7044A . . . . .	7-4
4-2	Model 7045A Y-Axis Simplified Block Diagram . . . . .	4-2	7-4	X-Axis DC Amplifier Schematic – 7044A . . . . .	7-5
5-1	Potentiometer Cleaning . . . . .	5-1	7-5	Y-Axis DC Amplifier Circuit Board – 7044A . . . . .	7-6
5-2	Potentiometer Lubrication . . . . .	5-2	7-6	Y-Axis DC Amplifier Schematic – 7044A . . . . .	7-7
5-3	X-Axis Potentiometer Replacement . . . . .	5-3	7-7	X-Axis DC Amplifier Circuit Board – 7045A . . . . .	7-8
5-4	Pen Lift Bar Removal . . . . .	5-4	7-8	X-Axis DC Amplifier Schematic – 7045A . . . . .	7-9
5-5	Carriage Arm Removal . . . . .	5-4	7-9	Y-Axis DC Amplifier Circuit Board – 7045A . . . . .	7-10
5-6	Y-Axis Balance Potentiometer . . . . .	5-4	7-10	Y-Axis DC Amplifier Schematic – 7045A . . . . .	7-11
5-7	X-Axis Stringing Removal . . . . .	5-5	7-11	TTL Circuit Board – Option 005 . . . . .	7-12
5-8	Drive Train Bearing Replacement . . . . .	5-5	7-12	TTL Schematic . . . . .	7-13
5-9	Y-Axis Servo Motor Replacement – Bottom Plate and Trailing Cable . . . . .	5-6	7-13	Time Base Circuit Board – Option 001 . . . . .	7-14
5-10	X and Y-Axis Restrung, 7044A Model . . . . .	5-7	7-14	Time Base Schematic . . . . .	7-15
5-11	X and Y-Axis Restrung, 7045A Model . . . . .	5-9			
5-12	Y-Axis Slewing Speed Test Setup . . . . .	5-11			

## LIST OF TABLES

Number	Page	Number	Page		
1-1	Specifications . . . . .	1-2	6-6	One Year Isolated Spare Parts List – Model 7045A . . . . .	6-34
1-2	Options . . . . .	1-3	6-7	Code List of Manufacturers . . . . .	6-38
1-3	Option Specifications . . . . .	1-5	7-1	Servo System Troubleshooting Chart . . .	7-16
5-1	Recommended Test Equipment . . . . .	5-8	7-2	Resetability Troubleshooting Chart . . .	7-17
5-2	Time Base Calibration Requirements . . .	5-18	7-3	Calibration and Linearity Troubleshoot- ing Chart . . . . .	7-18
6-1	Parts List – Model 7044A . . . . .	6-9	7-4	Input Resistance Troubleshooting Chart .	7-19
6-2	Miscellaneous Parts – Model 7044A . . .	6-14	7-5	Slewing Speed Troubleshooting Chart . . .	7-19
6-3	One Year Isolated Spare Parts List – Model 7044A . . . . .	6-16	7-6	Ac/Dc Common Mode Rejection Troubleshooting Chart . . . . .	7-20
6-4	Parts List – Model 7045A . . . . .	6-27	7-7	Overshoot Troubleshooting Chart . . . . .	7-20
6-5	Miscellaneous Parts – Model 7045A . . . . .	6-32			

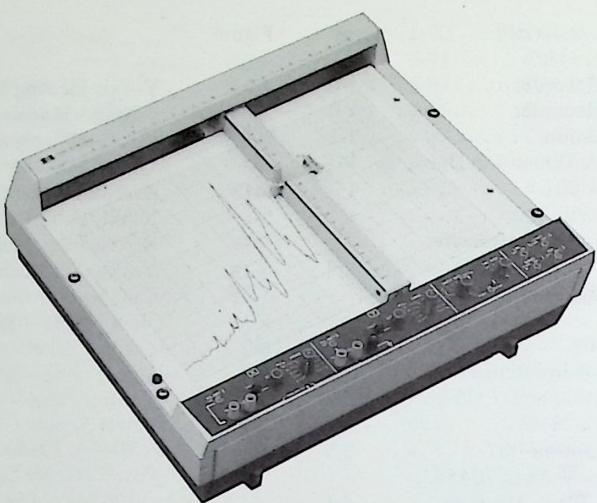


Figure 1-1. Model 7044A X-Y Recorder

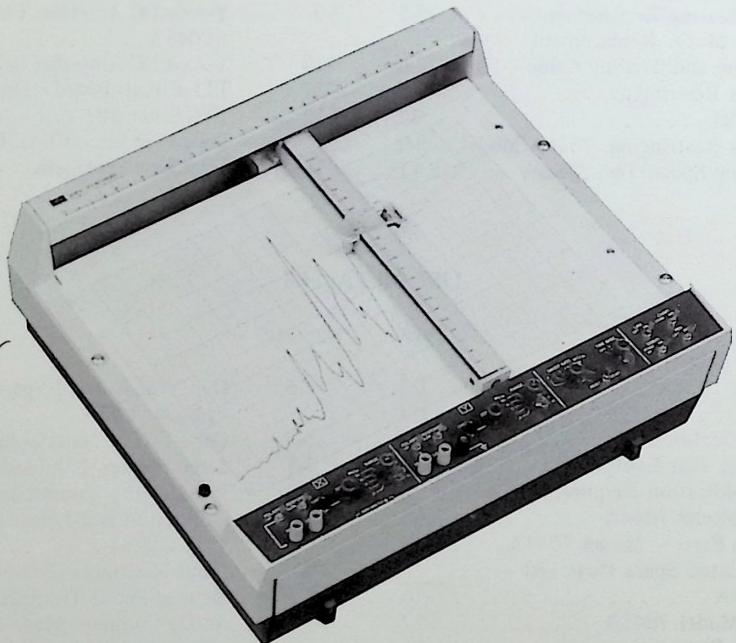


Figure 1-2. Model 7045A X-Y Recorder

## SECTION I

### INTRODUCTION

#### 1-1. DESCRIPTION.

#### 1-2. BASIC FRAME.

1-3. The Hewlett-Packard Models 7044A and 7045A X-Y Recorders are designed for the laboratory user to plot cartesian coordinate graphs from dc electrical information. The 7044A or 7045A will satisfy the needs of the user seeking reliability and dependability. The 7045A instrument features high speed capability and rapid acceleration to accurately record high-frequency and fast-moving input signals. It also offers a RESPONSE switch which allows the user the choice of a fast or slow response. Both models are equipped with the newly designed, continuous duty, aluminum framed dc servo motor; the X-axis of the 7045A contains the larger, faster motor. This design concept ends overheating or wear if the pen is driven offscale for an indefinite time. Other features found on the 7044A and 7045A include 10 calibrated dc input ranges in each axis from 0.5 mV/in. (0.25 mV/cm) to 10 V/in. (5 V/cm). Arbitrary full scale voltage ranges may be established with a variable input attenuator in conjunction with the calibrated dc ranges. A trouble-free Autogrip electrostatic hold-down platen capable of holding chart paper up to 11 x 17 inches and the standard European A3 size, a disposable pen with four color choices, and plastic coated wirewound balance potentiometer are also provided on both models. Latest circuitry design and assembly techniques have also been incorporated into both models, thereby reducing failure and maintenance time. Additionally, both instruments can be equipped with such options as Time Base, TTL Remote Control, X and Y Retransmitting Potentiometers, event Marker, Rear Connector, or Metric Scaling. See Figures 1-1 and 1-2 depicting the standard 7044A and 7045A models.

#### 1-4. MODEL - MANUAL INFORMATION.

1-5. This manual is applicable to the Model 7044A with a serial prefix of 1220A and the Model 7045A with a serial prefix of 1220A. The serial prefix is the first four digits and a letter of a two-part, ten-item serial number (0000A-00000) used to identify each Hewlett-Packard instrument (see Figure 1-3). Should any change to this manual be necessary, a new serial prefix will be assigned to the changed model and a change sheet (Manual Change) will be supplied defining the differences between the changed model and the one described within this manual. Other corrections due to any errors that existed when this manual was printed will be provided. This type of change, called Errata, also appears on the change sheet (Manual Change). For additional information pertaining to this instrument, or other

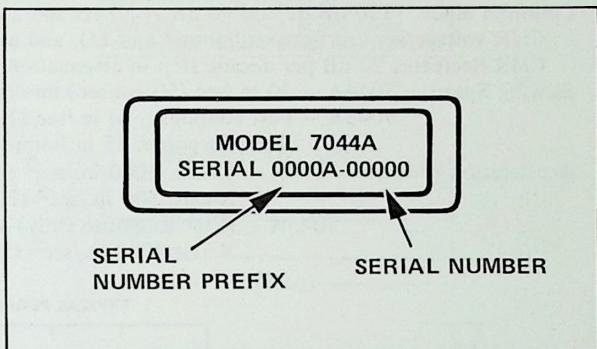


Figure 1-3. Instrument Identification

Hewlett-Packard instruments, contact the nearest Hewlett-Packard Sales/Service Office. The addresses are tabulated on the last two pages of this manual.

#### 1-6. SPECIFICATIONS.

1-7. Table 1-1 lists the specifications and accessories supplied or available with this recorder. Figure 1-4 illustrates the outside dimensions of the 7044A and 7045A models. Option specifications are defined beginning in paragraph 1-9 and Table 1-2.

#### 1-8. OPTIONS.

1-9. Optional features available for the two models are specified in Table 1-2. The following paragraphs describe these features which may be built into or combined with this instrument. Table 1-3 contains the specifications of the options.

#### 1-10. TIME BASE - OPTION 001.

1-11. Six speeds from 0.5 sec/in. to 100 sec/in. are available for both models in either the X or Y-axis. In the 7045A model, however, with the addition of the RESPONSE switch, the selection of the X or Y-axis time base sweep speed automatically results in the SLOW response of that selected axis; the other axis is not affected and operates normally. (May be ordered only at time of recorder purchase.) See Figure 1-5.

#### 1-12. EVENT MARKER - ELECTRIC - OPTION 002.

1-13. A remotely controlled event marker, installed at the top of the Y arm, identifies significant events in a recording sequence by making an upward deflection in the margin at

TABLE 1-1. SPECIFICATIONS

## PERFORMANCE SPECIFICATIONS

**Input Ranges:** 0.5, 1, 5, 10, 50 mV/in.; 0.1, 0.5, 1, 5, 10 V/in. (metric calibration available in 0.25, 0.5, 2.5, 5, 25 mV/cm; 0.05, 0.25, 0.5, 2.5, 5 V/cm).

**Type of Input:** Floating, 500 Vdc or peak ac maximum. Polarity reversal switch located on front panel, guard internally connected. Inputs through front panel 5-way binding posts or optional rear connector.

**Input Resistance:** 1 megohm constant on all ranges.

**Common Mode:** 110 dB dc and 90 dB at 50 Hz and above with 1 k ohm between HI and LO terminals,

CMR voltage applied between ground and LO, and attenuator on most sensitive range. On other ranges, CMR decreases 20 dB per decade step in attenuation.

**Slewing Speed:** 7044A - 20 in./sec (50 cm/sec) minimum.

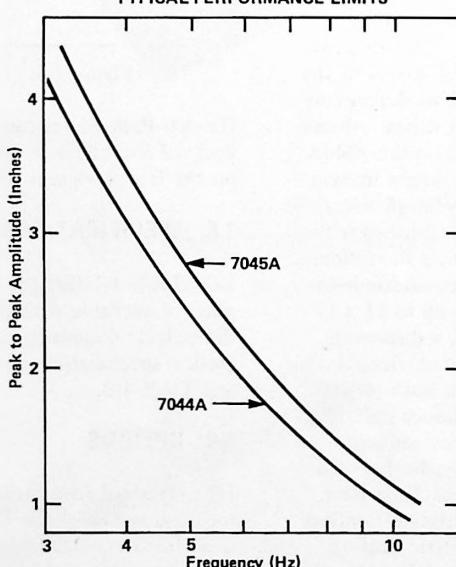
7045A - Fast Response, 30 in./sec (76 cm/sec) minimum;

Slow Response, 15 in./sec (36 cm/sec) typical.

**Acceleration (Peak):** 7044A - Y-axis, 1000 in./sec<sup>2</sup> (2540 cm/sec<sup>2</sup>),  
X-axis, 500 in./sec<sup>2</sup> (1270 cm/sec<sup>2</sup>).

7045A - (Fast Response Only) Y-axis 3000 in./sec<sup>2</sup> (7620 cm/sec<sup>2</sup>)  
X-axis 2000 in./sec<sup>2</sup> (5080 cm/sec<sup>2</sup>).

## TYPICAL PERFORMANCE LIMITS



**Accuracy:**  $\pm 0.2\%$  of full scale.

**Linearity (Terminal Based):**  $\pm 0.1\%$  of full scale.

**Resetability:** 0.1% of full scale.

**Overshoot:** 7044A - 2% of full scale (maximum).

7045A - 1% of full scale (maximum).

**Zero Set:** Zero may be placed anywhere on writing area or electrically off scale up to one full scale from zero index.

**Environmental (Operating):** Meets HP Class B which includes 0°C to 55°C and <95% RH (40°C).

## GENERAL SPECIFICATIONS

**Writing Mechanism:** Servo actuated ink pen.

**Writing Area:** 10 in. x 15 in. (25 cm x 38 cm).

**Paper Holddown:** Autogrip electric paper holddown grips charts 11 in. x 16.5 in. and standard European size A3 (29.7 cm x 42 cm) or smaller. Special paper not required.

**Pen Lift:** Electric (Remote, Option 007, via contact closure or TTL level).

**Power:** 115 or 230 volts ac  $\pm 10\%$ , 50 to 400 Hz; 7044A, 135 VA; 7045, 175 VA.

**Weight:** Net, 30 lb (13.7 kg); shipping 42 lb (19.1 kg).

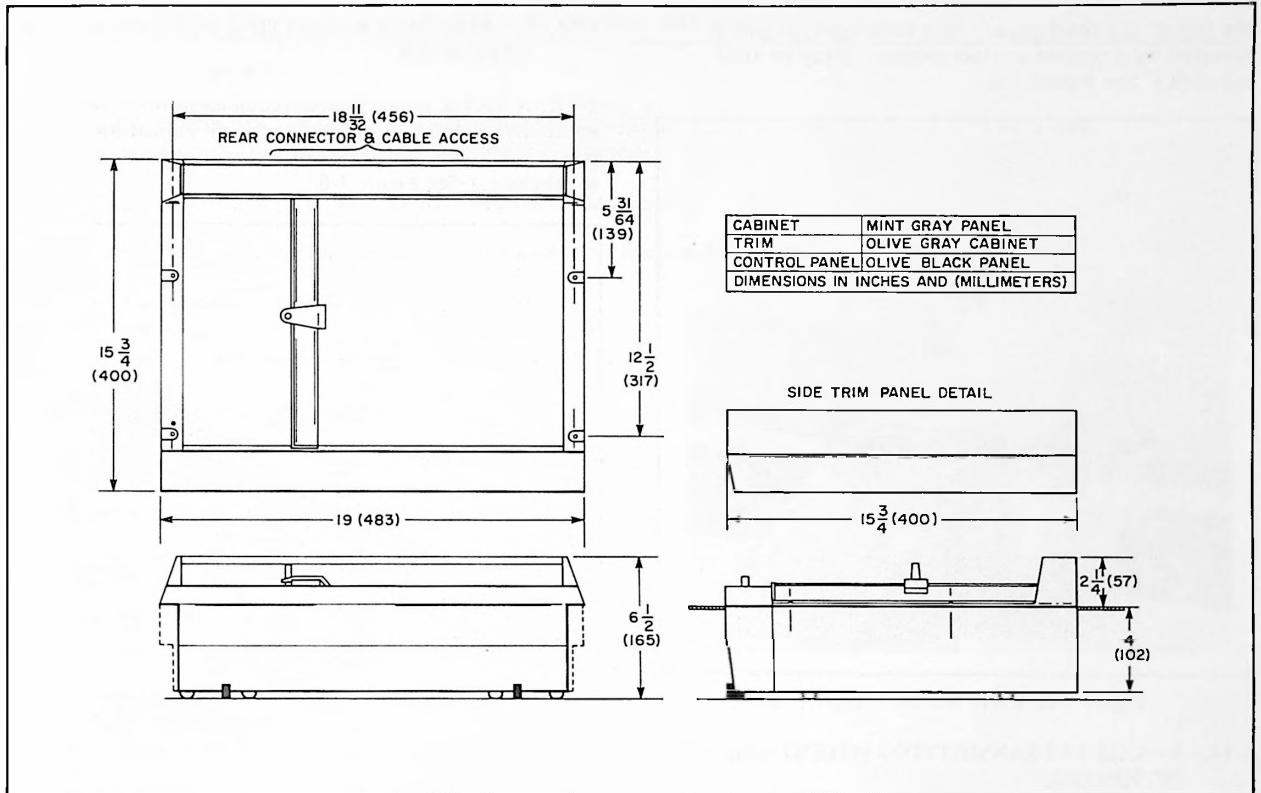


Figure 1-4. Model 7044A/7045A Dimension Drawing

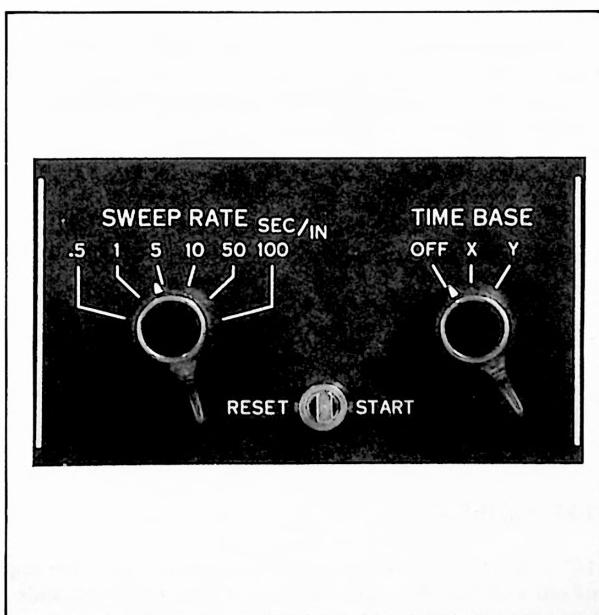


Figure 1-5. Time Base — Option 001

TABLE I-2. OPTIONS

OPTION	DESCRIPTION
001	Time Base X or Y
002	Event Marker (Electric) Plug-In (requires 007)
003	19.2 k Retransmitting Potentiometer, X-axis (requires 007)
004	13.1 k Retransmitting Potentiometer, Y-axis (requires 007)
005	TTL Remote (Autogrip, Servo Mute, Response, 7045A Only) (requires 007)
006	Metric
007	Rear Connector, 37 Pin

the top of the chart paper. The cartridge-type pen is actuated by a remote contact closure. (May be field installed.) See Figure 1-6.

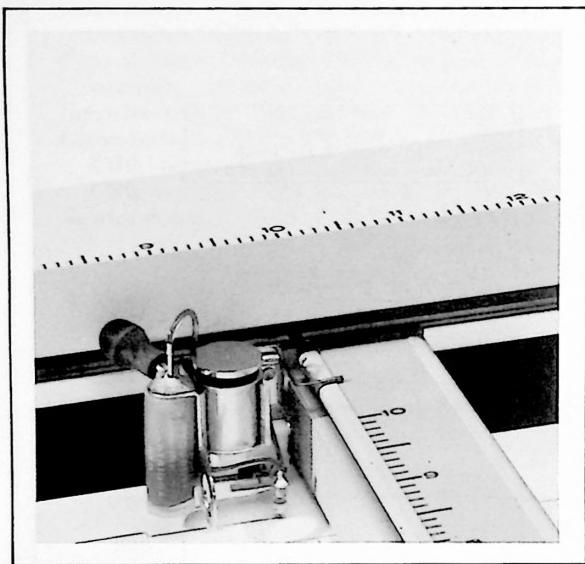


Figure 1-6. Event Marker – Option 002

1-14. X-AXIS RETRANSMITTING POTENTIOMETER – OPTION 003.

1-15. A 19.2 k potentiometer coupled to the 7044A/7045A servo drive supplies an accurate position indication of the pen in the X-axis. (May be field installed.) See Figure 1-7.

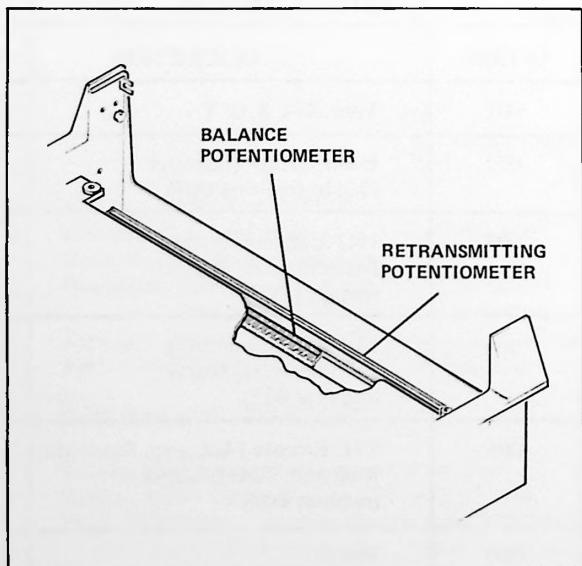


Figure 1-7. X-Axis Retransmitting Potentiometer – Option 003

1-16. Y-AXIS RETRANSMITTING POTENTIOMETER – OPTION 004.

1-17. A 13.1 k potentiometer coupled to the 7044A/7045A servo drive supplies an accurate position indication of the pen in the Y-axis. (May be ordered only at time of recorder purchase.) See Figure 1-8.

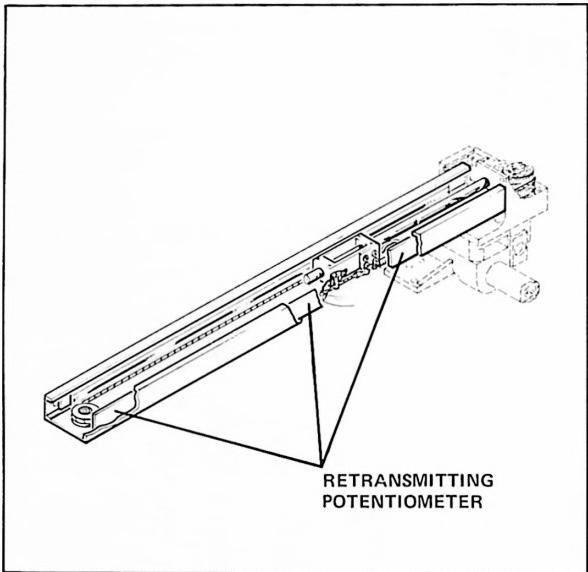


Figure 1-8. Y-Axis Retransmitting Potentiometer – Option 004

1-18. TTL REMOTE CONTROL – OPTION 005.

1-19. Transistor-Transistor Logic (TTL) interface for remote control of Autogrip, X and Y-axis servo mute, and response (7045A only) is provided for both 7044A and 7045A. (May be field installed.)

1-20. METRIC SCALING – OPTION 006.

1-21. Metrically scaled and calibrated version of either instrument is provided. (May be ordered only at time of recorder purchase.)

1-22. REAR CONNECTOR – OPTION 007.

1-23. All the necessary connections except power are interfaced through this installed option. A mating connector is supplied in the Accessory Kit. (May be ordered only at time of recorder purchase.) See Table 1-2.

1-24. ACCESSORIES.

1-25. Included in the standard Accessory Kit are a package of red and blue disposable pens, slidewire lubricant, slide-wire cleaner, and a one-ampere fuse. Additional accessories are added when certain options are added.

TABLE I-3. OPTION SPECIFICATIONS

TIME BASE – OPTION 001

Sweep Rates: Six selectable rates from 0.5 through 100 sec/in. (0.25 through 50 sec/cm). X or Y axis.  
TTL sweep indication provided if Option 007 is ordered.

Accuracy:  $\pm 1\%$  full scale at  $25^\circ\text{C}$  ( $\pm 0.1\%$  degrees C maximum).

Linearity:  $\pm 0.5\%$  full scale at  $25^\circ\text{C}$  (to 0.04%/degrees C maximum).

EVENT MARKER – ELECTRIC – OPTION 002

Marking Area: Upper margin aligned with X-axis position.

Excursion: Approximately 0.05 inch.

Ink Capacity: 0.45 cc cartridge, writing distance 500 ft minimum.

Control: Remotely by contact closure to ground. TTL logic control (Option 007 required).

RETRANSMITTING POTENTIOMETERS – OPTIONS 003 AND 004

Resistance: 19.2 k ohms  $\pm 10\%$  (X-axis)  
13.1 k ohms  $\pm 10\%$  (Y-axis)

Linearity:  $\pm 0.1\%$  full scale (terminal based).

Contact Resistance: 4 k ohms (maximum).

TTL REMOTE CONTROL – OPTION 005

Operating Levels: Contact closure (0.2 mA) to ground or TTL levels.  
Logic (0): Between -0.5 Vdc and +0.4 Vdc.  
Logic (1): Between +2.4 Vdc and +5.5 Vdc.

Controls: Allows remote control of Autogrip, Servo Standby, and Response (7045A only).

REAR CONNECTOR – OPTION 007

Connects event marker, X and Y retransmitting potentiometers, and TTL (all require rear connector for operation).

Standard models with rear connector provide X and Y inputs and pen lift TTL controls.

TTL and rear connector provide Autogrip and Servo Standby capability on 7044A. Additionally, X and Y Response on 7045A model.

Time Base and Rear Connector supplies START and RESET remote capability.



## SECTION II

### INSPECTION AND INSTALLATION

#### **2-1. INTRODUCTION.**

2-2. This section provides information for incoming inspection, installation, storage, and shipping of the 7044A and 7045A X-Y Recorders. Also included is the information required to field install and/or modify options for the two models.

#### **2-3. INCOMING INSPECTION.**

#### **2-4. MECHANICAL CHECKS.**

2-5. Inspect the instrument for mechanical damage, scratches, dents, or other defects. Also check the cushioning materials for signs of severe stress.

#### **2-6. ELECTRICAL CHECKS.**

2-7. The electrical performance of the instrument should be verified upon receipt. Performance checks, suitable for incoming inspection as well, are presented in Section V.

#### **2-8. DAMAGE CLAIMS.**

2-9. If the instrument is damaged in transit, or fails to meet specifications upon receipt, notify the carrier and the nearest Hewlett-Packard office immediately. A list of field offices is conveniently located in the back of this manual. Retain the shipping carton and padding material for the carrier's inspection. The field office will arrange for replacement or repair of your instrument without waiting for claim settlement against the carrier.

#### **2-10. STORAGE.**

2-11. When the instrument is to be stored for a period of time, the disposable pen and the event marker cartridge (if Option 002 is installed) should be removed and the upper part of the carriage arm clamped to the right side of the instrument to prevent damage during handling. Flush event marker ink lines out with water. Seal the instrument in moisture-proof covering with desiccant and repackage in a container similar to the original factory carton.

#### **2-12. SHIPPING.**

2-13. Before returning the instrument for any reason, notify the local field sales office of the difficulty encountered giving the model and serial number of the instrument. They will furnish shipping instructions. The following

precautions should be taken when repackaging the recorder:

- a. Remove disposable pen and event marker assembly (Option 002 if installed).
- b. Clamp the upper end of carriage arm and pen carriage to the right side of recorder with shipping clamp (HP Part No. 07040-60921) to prevent movement while in transit.
- c. Wrap instrument in heavy paper or plastic and surround with three to four inches of shock-absorbing material to cushion and prevent movement inside shipping container. Container should be sufficiently durable to prevent damage to instrument during handling. If in doubt, request a shipping carton from nearest Hewlett-Packard Sales/Service Office.

#### **2-14. RECORDER INSTALLATION.**

#### **2-15. MECHANICAL INSTALLATION.**

2-16. The instrument is equipped with built-in rack mounting brackets for placing in a standard 19-inch cabinet. Four screws (two on each side) are used for easy installation. Feet and side trim panels are provided for bench type operation. Remove side trim panels before rack mounting. See Figure 2-1.

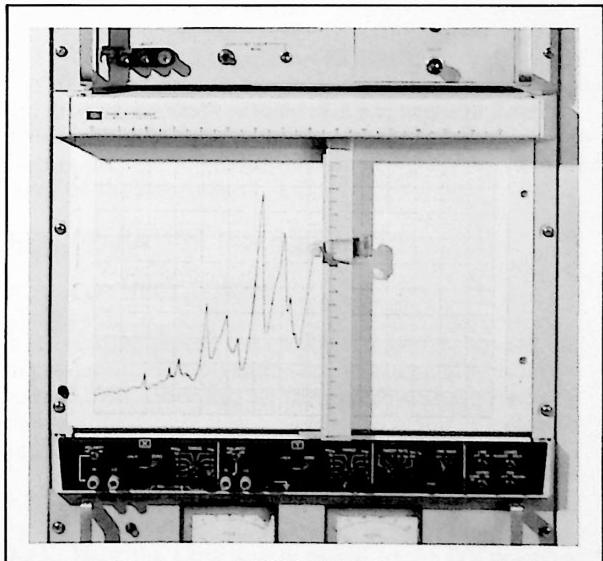


Figure 2-1. Recorder Installation

## **2-17. COOLING.**

2-18. Cooling is provided by convection. The location or mounting of the instrument must ensure adequate air circulation.

## **2-19. OPTION INSTALLATION/CONVERSION.**

2-20. These two models may be equipped with options which can increase the versatility and application to special operating requirements. The following paragraphs describe those options that can be installed or modified in the field.

### **2-21. EVENT MARKER – OPTION 002.**

2-22. Installation is accomplished for either model per the instructions accompanying Event Marker Kit, Part Number 07044-60001.

### **2-23. X-AXIS RETRANSMITTING POTENTIOMETER – OPTION 003.**

2-24. Installation is accomplished per instructions accompanying X-axis Retransmitting Potentiometer Kit, Part Number 07040-60912.

### **2-25. TTL REMOTE CONTROL – OPTION 005.**

2-26. To install this option in Model 7044A (Kit Part Number 07044-60780) or Model 7045A (Kit Part Number 07045-60150) perform the following procedure:

#### **NOTE**

It is necessary for Option 007, Rear Connector, to have been installed.

a. Stand recorder on front side. Remove bottom cover (6 screws).

b. Install TTL Remote Control Board, Part Number 07044-60300 (7044A) or 07045-60120 (7045A) in provided space in left extreme corner (3 screws). See Figure 2-2.

c. Connect four cable assemblies to Rear Connector.

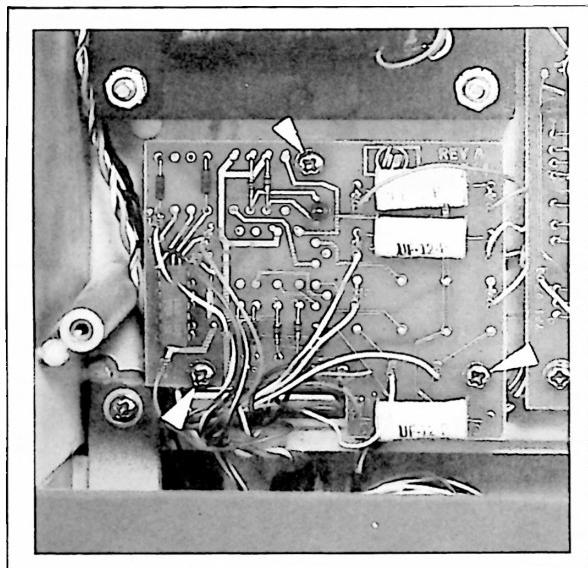


Figure 2-2. TTL Remote Control Installation

## SECTION III

### OPERATING INSTRUCTIONS

#### 3-1. OPERATING REQUIREMENTS.

##### 3-2. GENERAL.

3-3. The basic function of the Models 7044A and 7045A X-Y Recorders is to produce a cartesian coordinate graph showing the relationship between two variable functions. Slowly varying dc signals representing these functions are applied to the input terminals of the respective X and Y axis of the recorder and its controls adjusted so that the resulting graph will cover the desired region of the graph.

#### **CAUTION**

Before attempting to operate the instruments, the user should become familiar with the input requirements and various control functions as outlined in the following paragraphs.

##### 3-4. CONTROLS, CONNECTORS, AND INDICATORS.

3-5. The front and rear panel controls, connectors, and indicators are depicted and explained in Figures 3-1 and 3-2. The 37-pin rear connector, Option 007, is depicted in Figure 3-3.

#### 3-6. ELECTRICAL REQUIREMENTS.

##### 3-7. OPERATING POWER.

3-8. The ac power supplied to the models should be either 115 or 230 volts, 50 to 400 Hz, single phase. A voltage selector switch located on the underside of the instrument on the connector panel must be set to correspond to the available supply voltage. A 2-ampere fuse is used for 115-volt operation and a 1-ampere for 230 volts. A power cord is supplied to connect the recorder to the power source.

##### 3-9. INPUT SIGNALS.

3-10. The recorder's input terminals (HI and LO), located on the front panel, must be supplied with varying dc signals. These signals should vary at a rate within the response capabilities of the instruments and have amplitudes within their scale ranges or an erroneous recording may result. It is possible to have an excessive amount of ac noise present in the input signals, thereby resulting in recorder response becoming oscillatory and inaccurate. It is important that the side of the signal with the lowest impedance

to ground side is connected to the LO input terminal of the instrument. If this results in the recorder axis moving in the wrong direction, reset POLARITY switch to +RT or -RT for X-axis or to +UP or -UP for the Y-axis. If excessive normal mode noise is present on the input signals, an external filter(s) may be necessary.

##### 3-11. GROUNDING.

3-12. For optimum performance, the third prong of the ac power cord must be grounded. When operating from ungrounded power sources, secondary grounding method is mandatory.

#### 3-13. OPERATING PRECAUTIONS.

##### 3-14. SERVO.

3-15. To avoid unnecessary wear on the balance potentiometers and other mechanical parts, place the SERVO toggle switch in STANDBY when not recording.

3-16. If the input voltage exceeds the range setting, the pen will move quickly to one end of its travel and strike the drive mechanism stop. The motor will stop, protecting the recorder against damage until the input signal returns to an onscale value.

##### 3-17. RESPONSE SWITCH.

3-18. On the 7045A, position RESPONSE toggle switch in SLOW position. This permits making prerecording span and zero adjustments without the pen and arm driving against the stops at full slewing speed. This position also enables the user to record slow input signals or reduce the speed of the instrument.

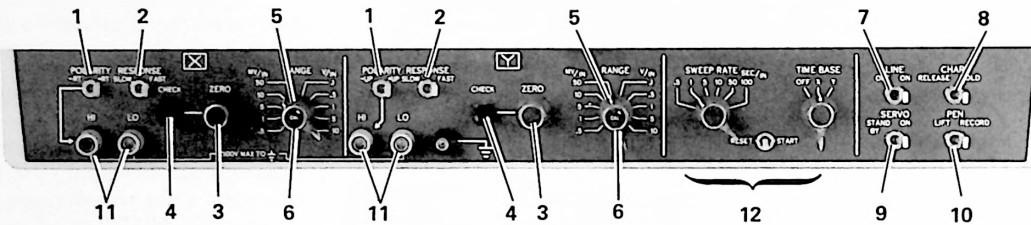
#### 3-19. OPERATING INSTRUCTIONS.

##### 3-20. CONNECT POWER.

3-21. Set the power voltage selector switch, located on the underside of the instrument, to either 115 or 230 volts ( $\pm 10\%$ ) depending on the available power source. Connect the power cord between the power receptacle and the power source.

##### 3-22. ENERGIZE RECORDER.

3-23. Place the LINE toggle switch to the ON position. This will furnish power to the recorder.

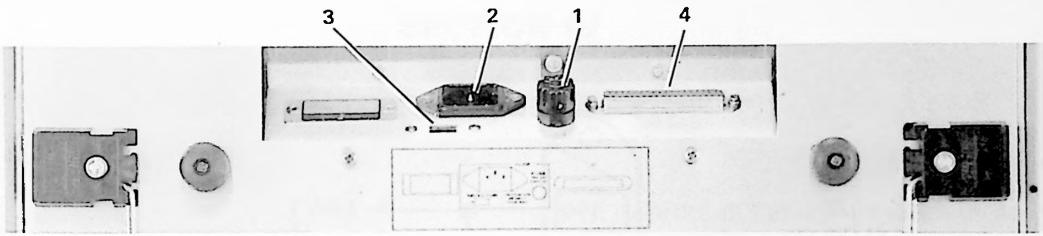


1. POLARITY SWITCHES (-RT +RT, -UP, +UP). Two toggle switches; one for the X-axis and the other for the Y-axis; provide polarity reversal.
2. RESPONSE SWITCH (7045A ONLY). A two-position toggle switch labeled SLOW and FAST. Use SLOW position for making prerecording adjustments, and also, if desired, record slow incoming signals or reduce speed of instrument.
3. ZERO CONTROLS. A control in each axis for adjusting the pen's zero position on the chart.
4. ZERO CHECK SWITCHES. A pushbutton switch to verify the zero setting of either the X or Y axis. When depressed, the input signal is disconnected and the pen returns to its zero position.
5. RANGE SWITCHES. A selector switch for each axis allowing the selection of 10 calibrated positions.
6. VERNIER CONTROL. A vernier control in each axis for multiplication of input range setting; overlaps two adjacent calibrated ranges.
7. LINE SWITCH. A two-position toggle switch; OFF and ON; that controls the application of the ac line voltage to the recorder.
8. CHART SWITCH. A two-position toggle switch; RELEASE and HOLD; that controls the chart holding function of the Autogrip table.
9. SERVO SWITCH. A two-position toggle switch; STANDBY and ON; that controls servo actuation for both axes.
10. PEN SWITCH. A two-position toggle switch; LIFT and RECORD; that controls the lowering and raising of the pen.
11. INPUT TERMINALS. Two input terminals are available for each axis. They are labeled HI and LO and will accept either open wire or banana plug connectors.
12. TIME BASE – OPTION 001. One control knob for the selection of six sweep speeds in either axis. To determine the axis, place toggle switch from OFF to X or Y, then select sweep using sweep rate knob. RESET/START toggle switch stops sweep cycle, lifts pen, and resets pen to original starting position when placed in RESET; in START position, drops pen, sweeps pen across chart at selected rate.

#### CAUTION

The input signal is not disconnected from the axis that has sweep. Although this input no longer affects that axis, to avoid accidentally overloading the input, remove the signal from the axis in sweep.

Figure 3-1. Control Panel – 7044A and 7045A



1. LINE FUSE HOLDER. For 115 Vac, use a 2-ampere fuse and for 230 Vac, use a 1-ampere fuse. A 2-ampere fuse is installed in the recorder at the factory. A 1-ampere fuse is supplied in the Accessory Kit.
2. POWER CORD RECEPTACLE. Use the power cord provided with the recorder.
3. LINE VOLTAGE SELECTOR SWITCH. A two-position slide switch labeled 115 and 230.

**CAUTION**

Operation with the LINE VOLTAGE SELECTOR switch in the incorrect position may damage the recorder.

4. REAR CONNECTOR – OPTION 007. A 37-pin connector for the application of all mainframe connections except power. A mating connector is supplied in the Accessory Kit.

Figure 3-2. Rear Panel

3-24. INSTALL PAPER.

3-25. Place chart paper on the recording platen and align the left edge with the paper stop. To energize the platen, place CHART toggle switch to HOLD.

3-26. INSTALL PEN.

3-27. The disposable pen is pushed into the notched holder located on the scale, and twisted clockwise to lock in holder.

**CAUTION**

The disposable pen incorporates a precision writing tip. Care must be taken not to damage this tip during pen changing or other handling. Writing by hand on any surface may damage pen tip. Use pen only in pen holder on recorder.

3-28. SET VERNIER CONTROL.

3-29. Vernier control enables operator to adjust recorder sensitivity to any value between fixed ranges. It is often used to adjust the recorder sensitivity to align with actual function to be measured – not necessarily voltage (i.e. 100 lbs/in., 20 dB/in.).

3-30. CONNECT INPUTS.

3-31. Connect the signal inputs to each axis through the front input terminals using open wires or banana connectors.

3-32. ZERO SET.

3-33. Connect the input signals to the recorder and adjust the zero position so that the resulting graph will cover the desired area on the paper.

3-34. LOWER PEN.

3-35. Lowering the pen for recording purposes is accomplished by positioning the PEN toggle switch to RECORD. When TTL, Option 005, is installed, pen lowering is energized by level changes to less than +0.4 Vdc. Changing level to between +2.4 and +5.5 volts will raise the pen.

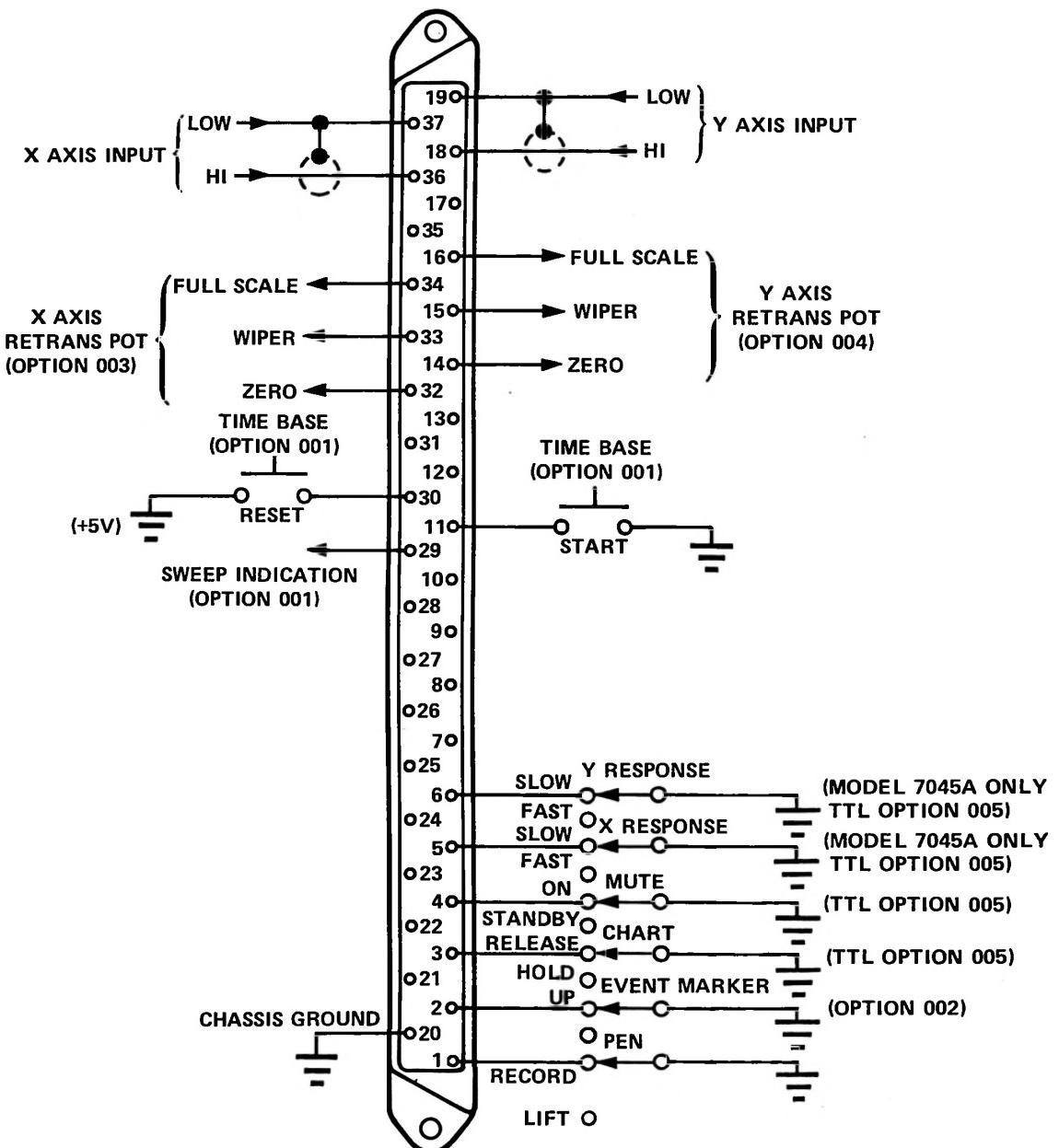


Figure 3-3. Rear Connector – Option 007

## **SECTION IV**

# **THEORY OF OPERATION**

## **4-1. GENERAL.**

#### **4-2. PURPOSE.**

4-3. The theory of operation for the Models 7044A and 7045A X-Y Recorders is explained in the following paragraphs detailing the models' important circuits. In addition, the Time Base Circuitry, Option 001, is also described. Simplified block diagrams of the standard instruments are presented in Figures 4-1 and 4-2.

#### **4-4. CIRCUIT DESCRIPTION.**

#### 4-5. PREAMPLIFIER (X AND Y AXES).

4-6. The Preamplifier consists of Q1, IC1, and their associated components. It is a dc amplifier that has a gain set by switch S2A. The sensitivity at the output of the preamplifier is 60 mV/inch.

#### 4-7. SLIDEWIRE BUFFER AMPLIFIER (X AND Y AXES).

4-8. IC3 (7044A/7045A X-Axis) or IC4 (7045A Y-Axis) is connected in a unity gain configuration and is connected to the Slidewire Wiper. It provides a high input impedance to the Slidewire Wiper.

#### 4.9. SERVO AMPLIFIER (X AND Y AXES).

4-10. The Servo Amplifier consists of IC4 (7044A/7045A X-Axis) or IC5 (7045A Y-Axis) and its associated components. The Servo Amplifier sums current from three sources; the Preamplifier output, the Slidewire Buffer Amplifier output, and the Zero Control Wiper.

#### 4-11. POLARITY SWITCH (X AND Y AXES).

4-12. The Polarity Switch, S1, determines whether IC2 (7044A/7045A X-Axis) or IC3 (7045A Y-Axis) and its

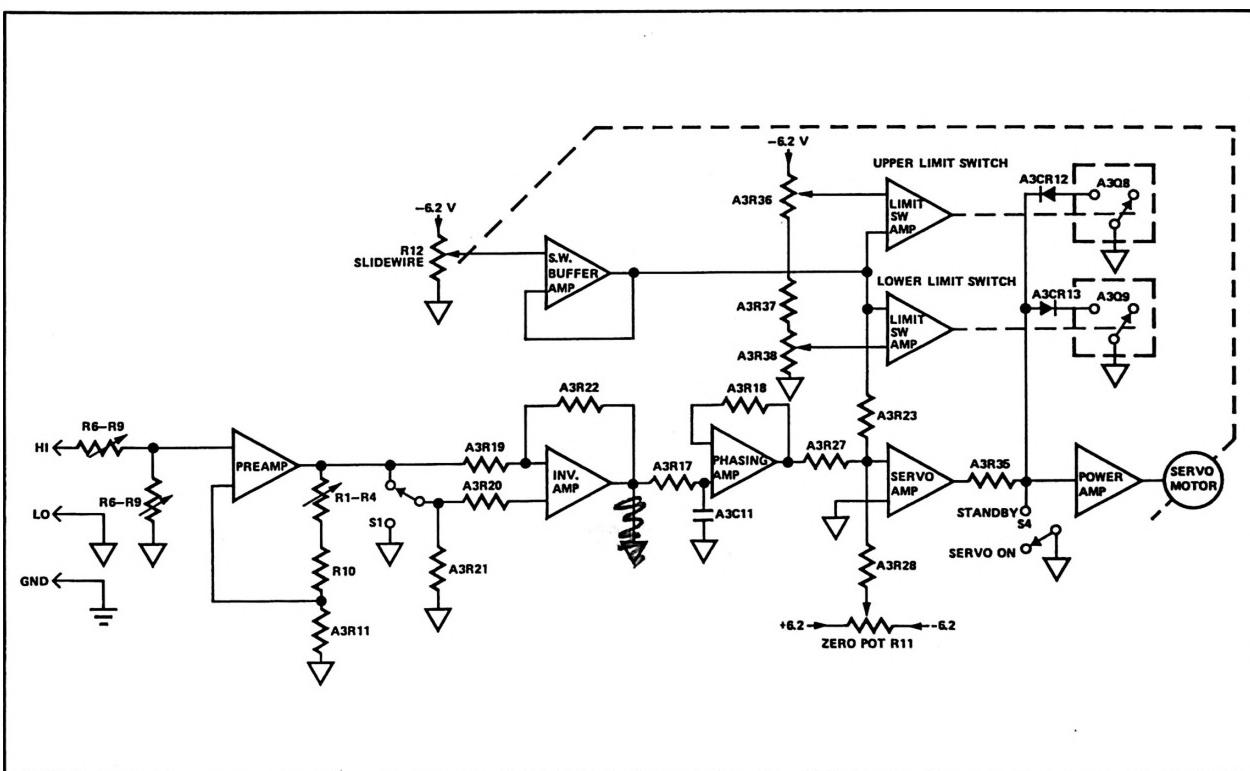


Figure 4-1. Model 7044A X and Y Axes/7045A X Axis Simplified Block Diagram

associated components have a gain of +1 or -1 and determines whether positive signals drive the recorder +UP or -UP (Y-axis) or +RT or -RT (X-axis).

#### 4-13. PHASING AMPLIFIER (7045A Y-AXIS).

4-14. The Phasing Amplifier consists of IC2 and its associated components. It changes the phase of the Y input signal to compensate for the difference between the X and Y mechanics, and, therefore, equalize the velocity lag in each axis.

#### 4-15. LIMIT SWITCHES (7045A Y-AXIS).

4-16. The upper and lower Limit Switches consist of IC6, Q4 and IC7, Q5, respectively, along with their associated components. IC6 and IC7 serve as comparators to sense when the pen position is in the upper or lower extremities of the desired pen travel. When the pen reaches one of these extremities, IC6 or IC7 switches Q4 or Q5 to a saturated state, and, thus, shorts the Servo Amplifier output.

#### 4-17. CIRCUIT DESCRIPTION – OPTIONS.

#### 4-18. TIME BASE – OPTION 001.

4-19. INTEGRATOR. The ramp for the sweep is generated by an Electronic Integrator consisting of Q1, IC7, and their associated components. When S1 relay is opened, C2 is charged from the operational amplifier AR3. This generates a linear ramp voltage that is applied to the X or Y axis amplifier. When S1 is closed, C2 is discharged and the sweep is reset.

4-20. CONTROL CIRCUITRY. The TTL gates IC1 (A, B, C, D) and IC2 (A, B, C, D) provide start, reset, and pen drop control functions. IC2A, IC2B, and IC2C gates form a NAND-LATCH flip-flop which holds the time base in either sweep or reset mode by controlling S1 through Q3. Gate IC1D and Q4 and their associated circuitry form a one-shot multivibrator with a one-second time delay that fires every time a reset command is given. This holds off the sweep from being re-started before the X-axis has returned to zero. When the sweep is ready to be started, a logic level appears at the output of gate IC2D.

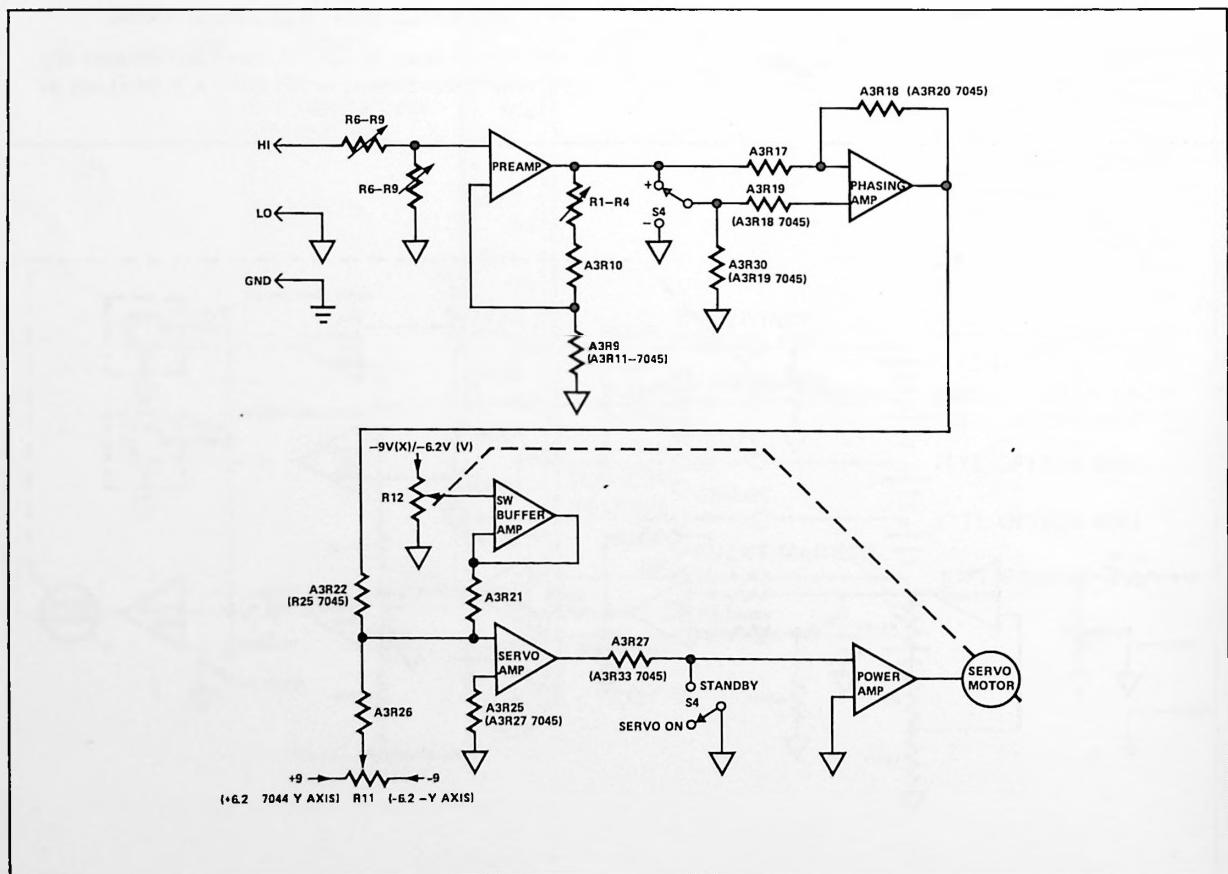


Figure 4-2. Model 7045A Y-Axis Simplified Block Diagram

## SECTION V

### MAINTENANCE, PERFORMANCE CHECKS, AND ADJUSTMENTS

#### 5-1. INTRODUCTION.

5-2. This section provides information for maintenance, performance testing, functional checks, and adjustments of the 7044A and 7045A X-Y Recorders. Maintenance procedures, tests, and adjustments will ensure that the instrument conforms to specifications. Functional checks maintain the instruments in operational condition. If the instruments fail to meet specifications, or are inoperable, refer to Section VII, Troubleshooting.

#### 5-3. PREVENTIVE MAINTENANCE.

##### 5-4. GENERAL.

5-5. These instruments must be maintained properly for accurate, trouble-free operation. This requires periodic lubrication, performance checks, and visual and electrical checks. In accordance with good maintenance procedures for all precision measuring instruments, Hewlett-Packard recorders should be protected from dust. Cover these instruments when not in use.

##### 5-6. ENVIRONMENTAL OPERATION.

5-7. These instruments are designed to operate over an ambient temperature range of 0°C to 55°C. Operation under other conditions will produce inaccurate results and may cause damage to the recorder. In areas with high humidity, graph paper may expand, affecting the accuracy of the grid lines. The area of operation should also be as free as possible of air contamination (soot, smoke, fumes, etc.). Excessive air contamination will require more frequent cleaning.

##### 5-8. CLEANING.

5-9. Thorough cleaning should be performed periodically. Intervals are determined by type of operation, local air contamination, and climatic conditions. Under normal use and conditions, cleaning intervals should be nine to twelve months. Cleaning routine should include the following:

- a. Remove platen and bottom cover. See paragraph 5-18, steps c and d.
- b. In accessible areas where there is only dust accumulation, cleaning can be accomplished with an air gun. In more accessible areas and where air gun will not remove dirt, dust, or ink, accumulation should be removed with

a sponge or cloth saturated in plain soap and warm water, then wiped dry.

c. Every 18 to 24 months, gears should be cleaned thoroughly with a solvent and relubricated. Do not use soap or water on these components.

d. The following method is recommended for cleaning Autogrip table. Dust and other accumulation of foreign films on table surface will lower paper holding force. The film may be removed and table holding ability restored by using the following cleaning procedure. If strong chemicals, abrasives, or too much water is used, table may be permanently damaged. To clean:

1. Remove pen and paper from recorder.
2. Select mild liquid soap. Do not use products with abrasive or corrosive chemicals.
3. Use soft cloth that will not scratch surface, but absorb water.
4. Saturate cloth in warm, soapy water. Wring cloth until majority of water has been removed.
5. Wipe table surface with damp cloth until table is clean.

#### CAUTION

Never permit water to stand on Autogrip surface. It may permanently damage the table.

6. Wipe any moisture from surface.
7. Allow a few minutes to dry before recording.

#### CAUTION

Do not use solvents or silicone-based cleaners of any type on the table.

##### 5-10. POTENTIOMETER CLEANING.

5-11. Irregular or jumpy recordings produced by smooth signals on a properly adjusted recorder may indicate worn or dirty potentiometers or wipers. To clean:

- a. Slide pen carriage to extreme right.

- b. Remove rear hood assembly. See paragraph 5-18, step b. Remove Autogrip table for X-axis potentiometer cleaning. See paragraph 5-18, step c.
- c. Lift pen holder up. Raise pen scale. Slidewire is accessible. See Figure 5-1.
- d. Spray entire potentiometer and wiper with Slidewire Cleaner, Part Number 5080-3605. Rapidly move pen carriage through several excursions.
- e. Thoroughly saturate a Kimwipe or cotton swab with cleaner. Rub potentiometer along entire length using tissue or swab. See Figure 5-1.

**NOTE**

If there is discoloration on tissue or swab, repeat until there is no stain. Then clean once more to ensure all contaminants are removed.

- f. After cleaning, lubricate sparingly with furnished Slidewire Lubricant, Part Number 5080-3635. Do not allow lubricant to get on drive cable. See Figure 5-2. This will reduce wear and chemical contamination.

**NOTE**

Cleaning X and/or Y Retransmitting Potentiometers, Options 003 and 004 respectively, is accomplished in the same manner as the Balance Potentiometers. The location of X Retransmitting Potentiometer on the 7044A and 7045A is under the rear hood assembly next to the X Balance Potentiometer. The Y Retransmitting Potentiometer is on the pen carriage opposite the Balance Potentiometer on the 7044A and 7045A.

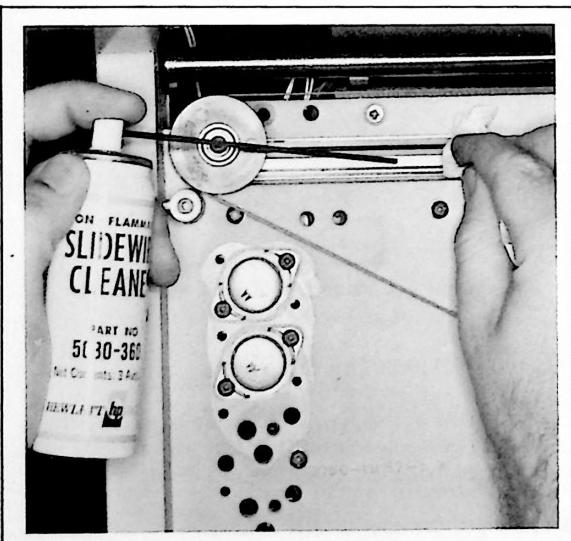


Figure 5-1. Potentiometer Cleaning

**5-12. LUBRICATION.**

5-13. This is a precision instrument. Gears and other moving parts have very close tolerances. Intervals between periodic lubrication are determined by the type of operation, local air contamination, and climatic conditions. All ball bearings are pre-lubricated. No lubrication is needed for them. The procedure for periodic lubrication is as follows:

- a. Clean and lubricate balance potentiometer and clean X-axis slide rod with dry Kimwipe every 3 to 6 months. See paragraph 5-11.

**b. Every 18 to 24 months:**

- 1. Clean and lubricate drive gears and guide under Y-axis slider rod with light grade silicone grease, Part Number 6040-0297. A light film of grease is sufficient.
- 2. Clean and lubricate Y-axis slider rod with instrument oil, Part Number 6040-0220.
- 3. Clean X-axis slider rod with dry Kimwipe; do not lubricate.

**5-14. VISUAL INSPECTION AND MECHANICAL FREEDOM TEST.**

5-15. During periodic cleaning and lubrication, a planned inspection should be performed. The following steps are a general approach.

- a. Check both X and Y drive gears for proper adjustment (zero backlash), and any worn or damaged teeth.
- b. Inspect X-axis drive cable pulleys for any binding.
- c. Ensure servo motors are mounted securely.

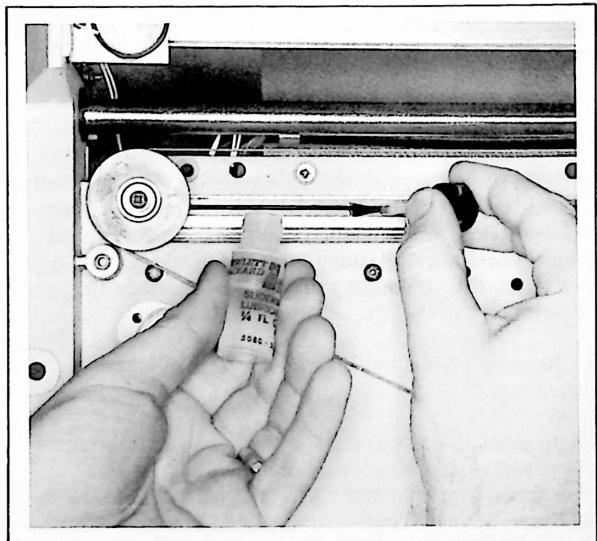


Figure 5-2. Potentiometer Lubrication

d. Slide pen carriage through several excursions, listening for scrapes, grinding noises, etc., while feeling for any binding in the movement. Repeat procedure for carriage arm. If binding or other problem exists, perform step g.

e. Check cables of both axes for evidence of fraying or rubbing.

f. Check components for evidence of overheating, loose connections, cracked circuit boards, or other defects.

g. Remove bottom cover per paragraph 5-18, step c. Disconnect X servo motor from X-axis Amplifier Board. Connect servo motor to output of Power Supply. Set Power Supply for output of 3 V for 7044A or 1.5 V output for 7045A recorder. Monitor on Digital Voltmeter. Servo motor should drive X-axis arm from one stop to another. If arm stops along travel, mechanical bind may exist. Clean slider rod. If situation continues, perform paragraph 5-87, step f, correct bind, or replace servo motor per paragraph 5-30.

h. Repeat step g for the Y-axis. For both models, set Power Supply for output of 3 V.

## 5-16. MECHANICAL MAINTENANCE.

### 5-17. DISASSEMBLY/ASSEMBLY.

5-18. Access to components for maintenance, checks, and adjustments require removal of exterior parts first, such as panels, covers, etc. To remove certain parts, perform the following procedures:

a. Rear Hood Assembly — remove two screws from back side of cover.

b. Bottom Cover — set on front (panel at bottom). Remove six screws. All circuit boards are visible.

c. Autogrip Table — for maintenance on X-axis potentiometer, wipers, cable assembly, etc., remove four screws, slide pen carriage to right, ease platen up and out on left side, disconnecting two pins to Power Supply Board before easing platen all the way out.

#### NOTE

The majority of screws in the two models are Phillips; however, they are a new and improved type called POSIDRIV. These screws are less likely to deform or strip, provided the special POSIDRIV screwdriver is used. Two models are available, the small model, Part Number 8710-0899, and the larger one, Part Number 8710-0900.

### 5-19. X-AXIS POTENTIOMETER REPLACEMENT.

5-20. To remove and replace X-axis Balance Potentiometer, perform the following steps.

a. Remove disposable pen. Remove Rear Hood Assembly, platen, and bottom cover. See paragraph 5-18.

b. Place recorder right side up. Remove one screw holding wiper block to slider block. Ease out carefully as wiper assembly is easily damaged.

c. Slide carriage arm to right side. Stand recorder on right side. Remove three nuts holding potentiometer from underside of recorder. See Figure 5-3.

d. Remove screw retaining left end of X slider rod and loosen screw on right end.

e. Partially ease out X-axis balance potentiometer.

f. Carefully unsolder three wires from potentiometer (note wire colors).

g. Remove potentiometer. Lift slider rod to allow clearance.

h. Install new balance potentiometer, Part Number 07040-60570.

i. Reassemble, reversing procedures.

### 5-21. X-AXIS WIPER REPLACEMENT.

5-22. The wiper assembly is manufactured with very close tolerances necessary for long life and reliability. The wiper is located on the X-axis wiper block. To remove, perform step b, paragraph 5-20. Install new wiper, Part Number 5080-8117 with the same screw that held the old wiper.

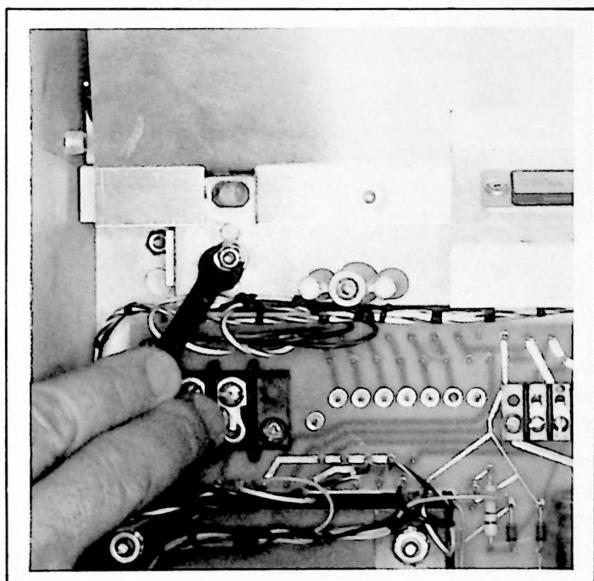


Figure 5-3. X-Axis Potentiometer Replacement

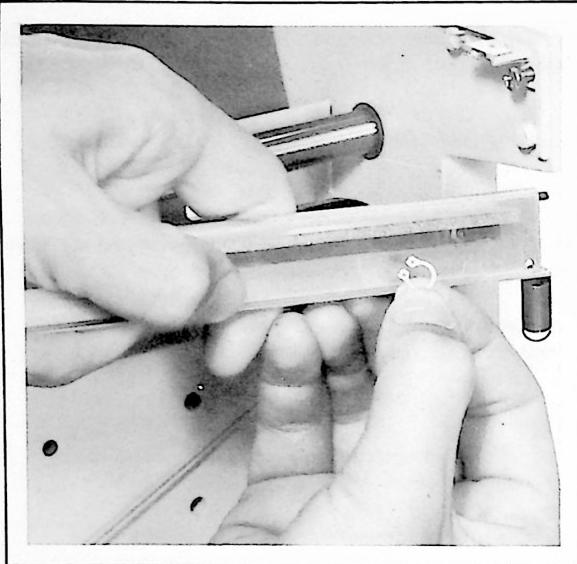


Figure 5-4. Pen Lift Bar Removal

5-23. Y-AXIS POTENTIOMETER REPLACEMENT.

5-24. To remove and replace Y-axis Balance Potentiometer:

- a. Remove disposable pen. Remove Rear Hood Assembly and platen. See paragraph 5-18.
- b. Unhook spring at right side of pen lift bar. Snap off retaining ring at right end of pen lift bar. Lift bar up and out. See Figure 5-4.
- c. Insert small flat blade screwdriver under drive cable near Y-axis servo motor pinion. Pry up on cable while turning gear/pulley clockwise. Cable will snap free.
- d. Remove screw at motor end of carriage arm. See Figure 5-5.
- e. Carefully press slidewire wipers free of potentiometer to prevent damage while easing potentiometer assembly from under slider rod/carriage assembly. Free Y-axis stringing from bottom pulley.
- f. Unsolder three wires from potentiometer. Note wire colors.
- g. Y-axis balance potentiometer assembly should now be free of recorder. See Figure 5-6. Remove bottom pulley assembly and install on new potentiometer assembly, Part Number 07040-60550.
- h. Restring Y-axis. Reassemble, reversing procedure.
- i. Lubricate slider rod, guide under slider rod, and balance potentiometer.

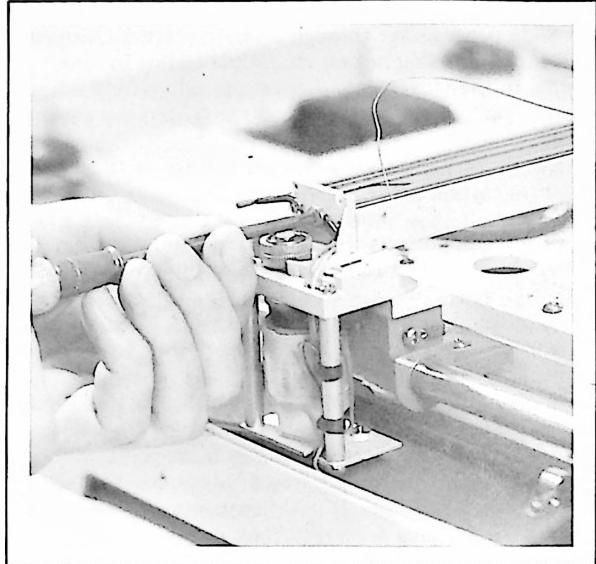


Figure 5-5. Carriage Arm Removal

5-25. Y-AXIS WIPER REPLACEMENT.

5-26. The wiper assembly is located on the Y slider block inside the recording arm. To remove, perform the following steps:

- a. Remove disposable pen. Remove Rear Hood Assembly and platen. See paragraph 5-18.
- b. Lift open Y scale. Remove pen holder assembly by removing four screws.

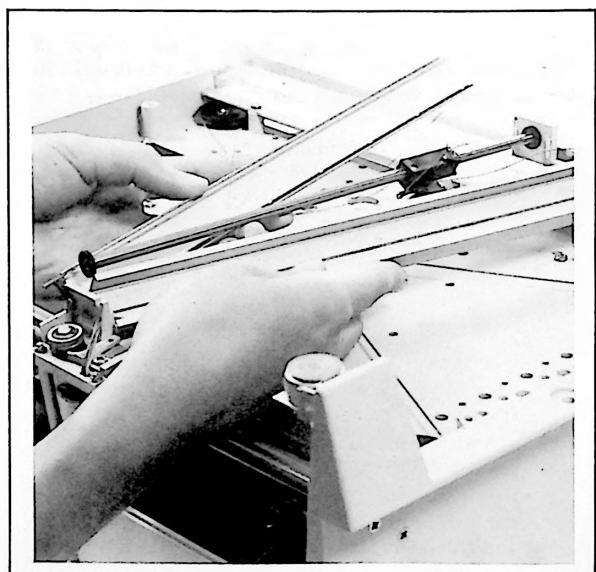


Figure 5-6. Y-Axis Balance Potentiometer Removal

- c. Move Y slider block toward bottom of recording arm.
- d. Carefully insert small piece of heavy paper or card between Y wiper contacts and slidewire to protect potentiometer.
- e. Remove POZIDRIV screw which retains Y axis slider rod at bottom of recording arm. Remove Y scale.
- f. Carefully lift slider block upward and rotate to provide access to wiper assembly.
- g. Remove wiper assembly held by one screw.
- h. Install new wiper, Part Number 5080-8117, in reverse. Clean and lubricate potentiometer, see paragraph 5-11.

#### NOTE

If Options 003 and/or 004, X and Y Retransmitting Potentiometer, respectively, are installed, the procedure for removal and replacement is identical to X and Y Balance Potentiometer removal and replacement. The part number for the X-axis Retransmitting Potentiometer is 07040-60570; the Y-axis Retransmitting Potentiometer is 07040-60560.

#### 5-27. X-AXIS DRIVE GEAR REPLACEMENT.

5-28. To replace the X-axis drive gear, perform the following procedure:

- a. Remove disposable pen. Remove Rear Hood Assembly, platen, and bottom cover. See paragraph 5-18.
- b. Loosen X-axis stringing by loosening screw on slider block. See Figure 5-7. Remove stringing from drive gear. Use masking tape to hold string in place.
- c. Stand recorder on front side, hold nut and remove No. 6-32 screw mounting gear. Remove gear. See Figure 5-8.
- d. Replace with new gear assembly, Part Number 07040-60710.
- e. Reassemble in reverse. Restring per paragraph 5-33 for 7044A or 5-34 for 7045A.
- f. Adjust gear backlash per paragraph 5-82.

#### 5-29. SERVO MOTOR MAINTENANCE.

5-30. The servo motors are basically free from maintenance. The high thermal mass aluminum frames and all-ball-bearing construction provide long life. Do not disassemble a servo motor as this will result in weakening the magnetic field strength and produce substandard performance. If it becomes necessary, however, to replace either the X or the

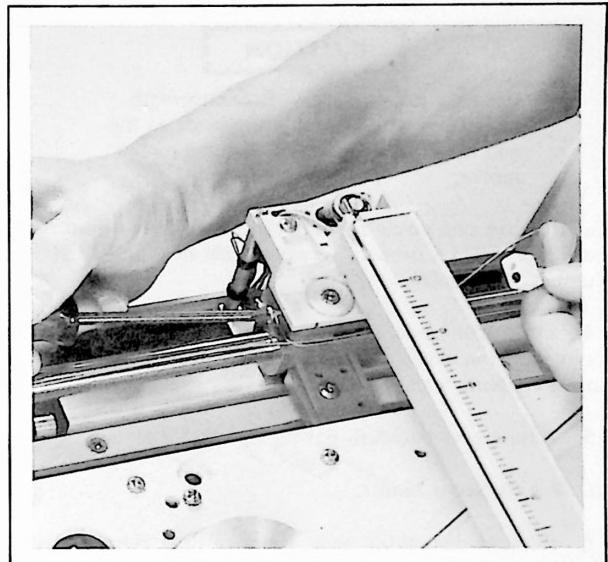


Figure 5-7. X-Axis Stringing Removal

Y-axis servo motor, perform the procedure indicated in the following steps:

##### a. X-Axis Servo Motor.

1. Remove disposable pen. Remove Rear Hood Assembly, platen, and bottom cover. See paragraph 5-18.
2. Stand recorder on front side. Unsolder two wires from feedthrough capacitors. Note wire colors. Remove third lead (ground) by removing Phillips screw.

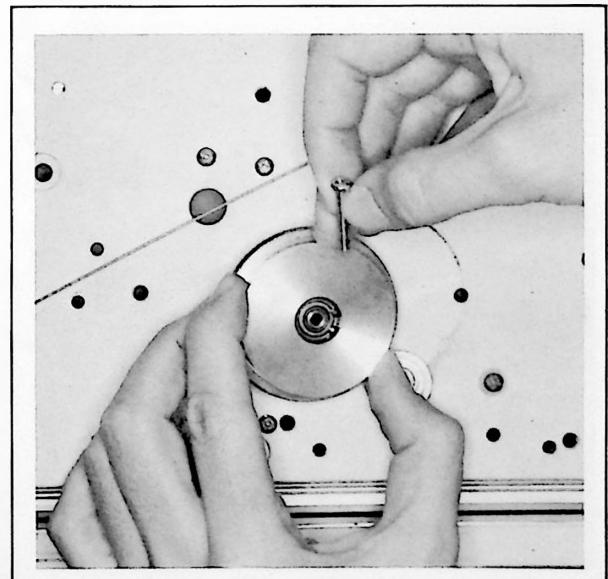


Figure 5-8. Drive Train Bearing Replacement

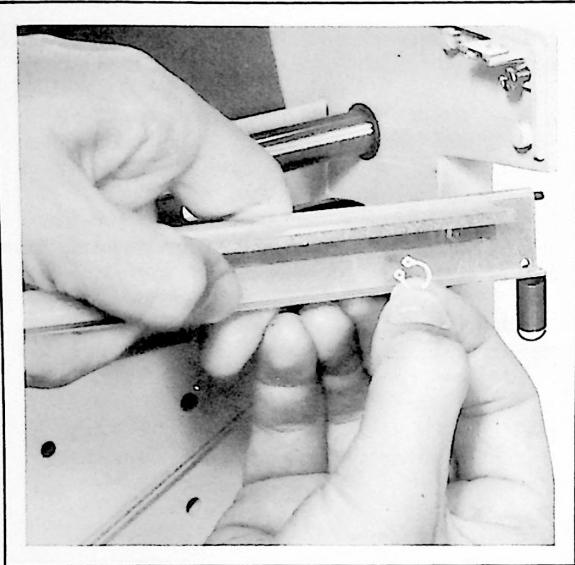


Figure 5-4. Pen Lift Bar Removal

**5-23. Y-AXIS POTENTIOMETER REPLACEMENT.**

**5-24. To remove and replace Y-axis Balance Potentiometer:**

a. Remove disposable pen. Remove Rear Hood Assembly and platen. See paragraph 5-18.

b. Unhook spring at right side of pen lift bar. Snap off retaining ring at right end of pen lift bar. Lift bar up and out. See Figure 5-4.

c. Insert small flat blade screwdriver under drive cable near Y-axis servo motor pinion. Pry up on cable while turning gear/pulley clockwise. Cable will snap free.

d. Remove screw at motor end of carriage arm. See Figure 5-5.

e. Carefully press slidewire wipers free of potentiometer to prevent damage while easing potentiometer assembly from under slider rod/carriage assembly. Free Y-axis stringing from bottom pulley.

f. Unsolder three wires from potentiometer. Note wire colors.

g. Y-axis balance potentiometer assembly should now be free of recorder. See Figure 5-6. Remove bottom pulley assembly and install on new potentiometer assembly, Part Number 07040-60550.

h. Restring Y-axis. Reassemble, reversing procedure.

i. Lubricate slider rod, guide under slider rod, and balance potentiometer.

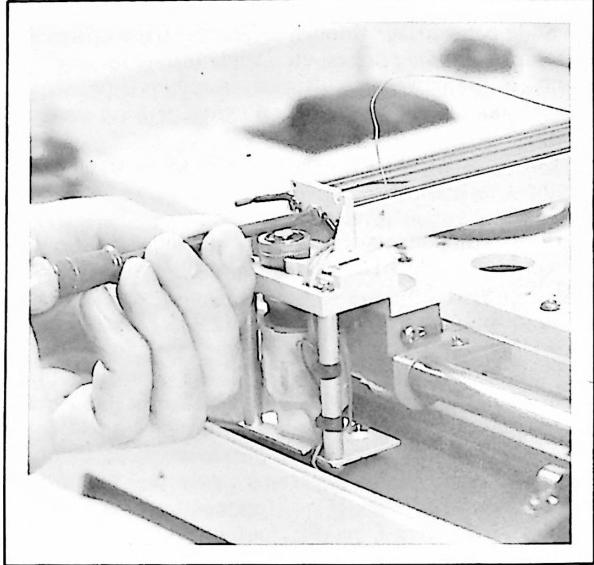


Figure 5-5. Carriage Arm Removal

**5-25. Y-AXIS WIPER REPLACEMENT.**

**5-26. The wiper assembly is located on the Y slider block inside the recording arm. To remove, perform the following steps:**

a. Remove disposable pen. Remove Rear Hood Assembly and platen. See paragraph 5-18.

b. Lift open Y scale. Remove pen holder assembly by removing four screws.

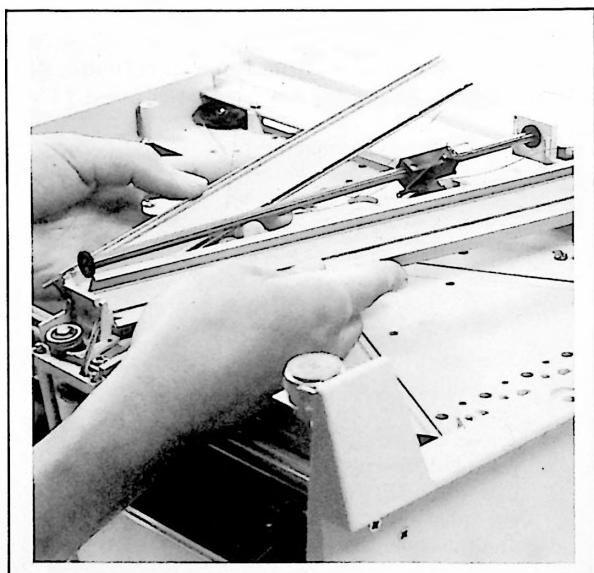


Figure 5-6. Y-Axis Balance Potentiometer Removal

- c. Move Y slider block toward bottom of recording arm.
- d. Carefully insert small piece of heavy paper or card between Y wiper contacts and slidewire to protect potentiometer.
- e. Remove POZIDRIV screw which retains Y axis slider rod at bottom of recording arm. Remove Y scale.
- f. Carefully lift slider block upward and rotate to provide access to wiper assembly.
- g. Remove wiper assembly held by one screw.
- h. Install new wiper, Part Number 5080-8117, in reverse. Clean and lubricate potentiometer, see paragraph 5-11.

#### NOTE

If Options 003 and/or 004, X and Y Retransmitting Potentiometer, respectively, are installed, the procedure for removal and replacement is identical to X and Y Balance Potentiometer removal and replacement. The part number for the X-axis Retransmitting Potentiometer is 07040-60570; the Y-axis Retransmitting Potentiometer is 07040-60560.

#### 5-27. X-AXIS DRIVE GEAR REPLACEMENT.

5-28. To replace the X-axis drive gear, perform the following procedure:

- a. Remove disposable pen. Remove Rear Hood Assembly, platen, and bottom cover. See paragraph 5-18.
- b. Loosen X-axis stringing by loosening screw on slider block. See Figure 5-7. Remove stringing from drive gear. Use masking tape to hold string in place.
- c. Stand recorder on front side, hold nut and remove No. 6-32 screw mounting gear. Remove gear. See Figure 5-8.
- d. Replace with new gear assembly, Part Number 07040-60710.
- e. Reassemble in reverse. Restring per paragraph 5-33 for 7044A or 5-34 for 7045A.
- f. Adjust gear backlash per paragraph 5-82.

#### 5-29. SERVO MOTOR MAINTENANCE.

5-30. The servo motors are basically free from maintenance. The high thermal mass aluminum frames and all-ball-bearing construction provide long life. Do not disassemble a servo motor as this will result in weakening the magnetic field strength and produce substandard performance. If it becomes necessary, however, to replace either the X or the

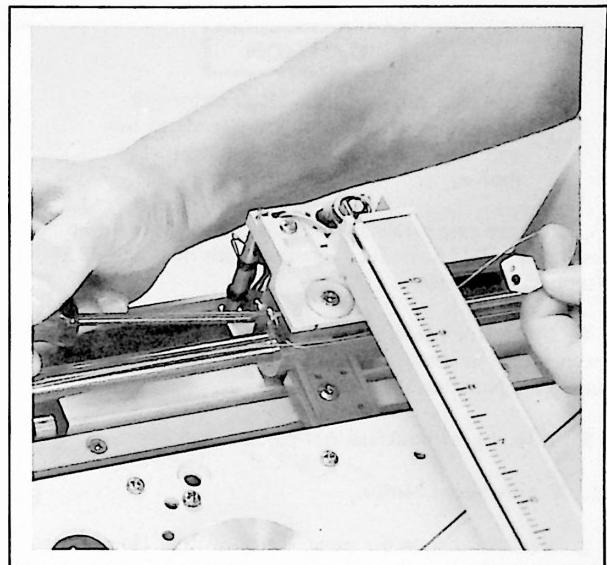


Figure 5-7. X-Axis Stringing Removal

Y-axis servo motor, perform the procedure indicated in the following steps:

- a. X-Axis Servo Motor.
  - 1. Remove disposable pen. Remove Rear Hood Assembly, platen, and bottom cover. See paragraph 5-18.
  - 2. Stand recorder on front side. Unsolder two wires from feedthrough capacitors. Note wire colors. Remove third lead (ground) by removing Phillips screw.

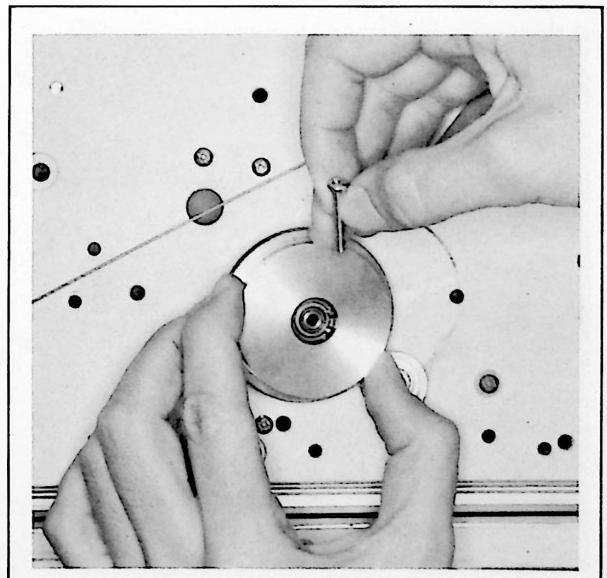


Figure 5-8. Drive Train Bearing Replacement

**CAUTION**

Use care not to break off feedthrough capacitors when unsoldering leads as this will result in irreparable damage to the motor.

3. Remove one screw holding clamp and servo motor to casting on 7044A model. Replace with new unit, Part Number 5060-6608.
  4. From front side, remove two No. 6-32 screws holding servo motor casting on 7045A model. Replace with new unit, Part Number 5060-6627.
  5. Adjust gear backlash per paragraph 5-82.
- b. Y-Axis Servo Motor.
1. Remove disposable pen. Remove Rear Hood Assembly, platen, and bottom cover. See paragraph 5-18.
  2. Unhook spring at right side of pen lift bar. Snap off retaining ring at right end of pen lift bar. Lift bar up and out. See Figure 5-4.
  3. Stand recorder on front side. Slide carriage arm to extreme right as viewed from rear of recorder.
  4. Remove two Phillips POZIDRIV screws holding plate behind motor. Position plate and cable clear of motor. See Figure 5-9.
  5. Unsolder two wires from feedthrough capacitors. Remove third lead (ground) by removing screw.



Figure 5-9. Y-Axis Servo Motor Replacement – Bottom Plate and Trailing Cable

**CAUTION**

Use care not to break off feedthrough capacitors when unsoldering leads as this will result in irreparable damage to the motor.

6. Remove screw, nut, and washer holding servo motor mounting clamp to motor.

7. Connect wires to new servo motor, Part Number 5060-6608. Replace shrink tubing before installing servo motor.

8. Install servo motor.

### 5-31. Y–AXIS RESTRINGING.

- 5-32. To restring, using Y-axis cable assembly, Part Number 07040-60913, perform the following procedure:

- a. Remove disposable pen. Remove Rear Hood Assembly, Pen Lift Bar, and separate slider rod/carriage arm from potentiometer assembly. See paragraph 5-24, steps a through e and Figure 5-4. Remove old drive cable assembly.

- b. Install new drive cable assembly consisting of cable spring, cable crimps, cable mounting bracket, and seven-strand stainless steel cable as follows (see Figure 5-10):

1. Install new cable mounting bracket to slider block with four screws previously removed.
2. Insert spring into same hole in cable mounting bracket to which other end of cable is attached.
3. Reassemble carriage arm, making sure cable is between pen block and slidewire. Care should be taken not to damage wiper.
4. Loop cord around upper and lower pulleys.
- c. Reassemble.
- d. Check wiper tracking. Minor adjustments can be made by twisting metal wiper base with force from small screwdriver.

### 5-33. 7044A X–AXIS RESTRINGING.

- a. Remove rear hood and platen. See paragraph 5-18, steps b, c, and d.

- b. Scribe ends of lower paper guide located on front side under the lower carriage arm to make realignment easier. Remove guide by removing three screws.

- c. Place carriage arm in center of travel. Remove old stringing by taking out screw on slider block and loosening adjustment nut at bottom of arm. Block slides out to expose loop part of stringing. Unwind. See Figure 5-7.

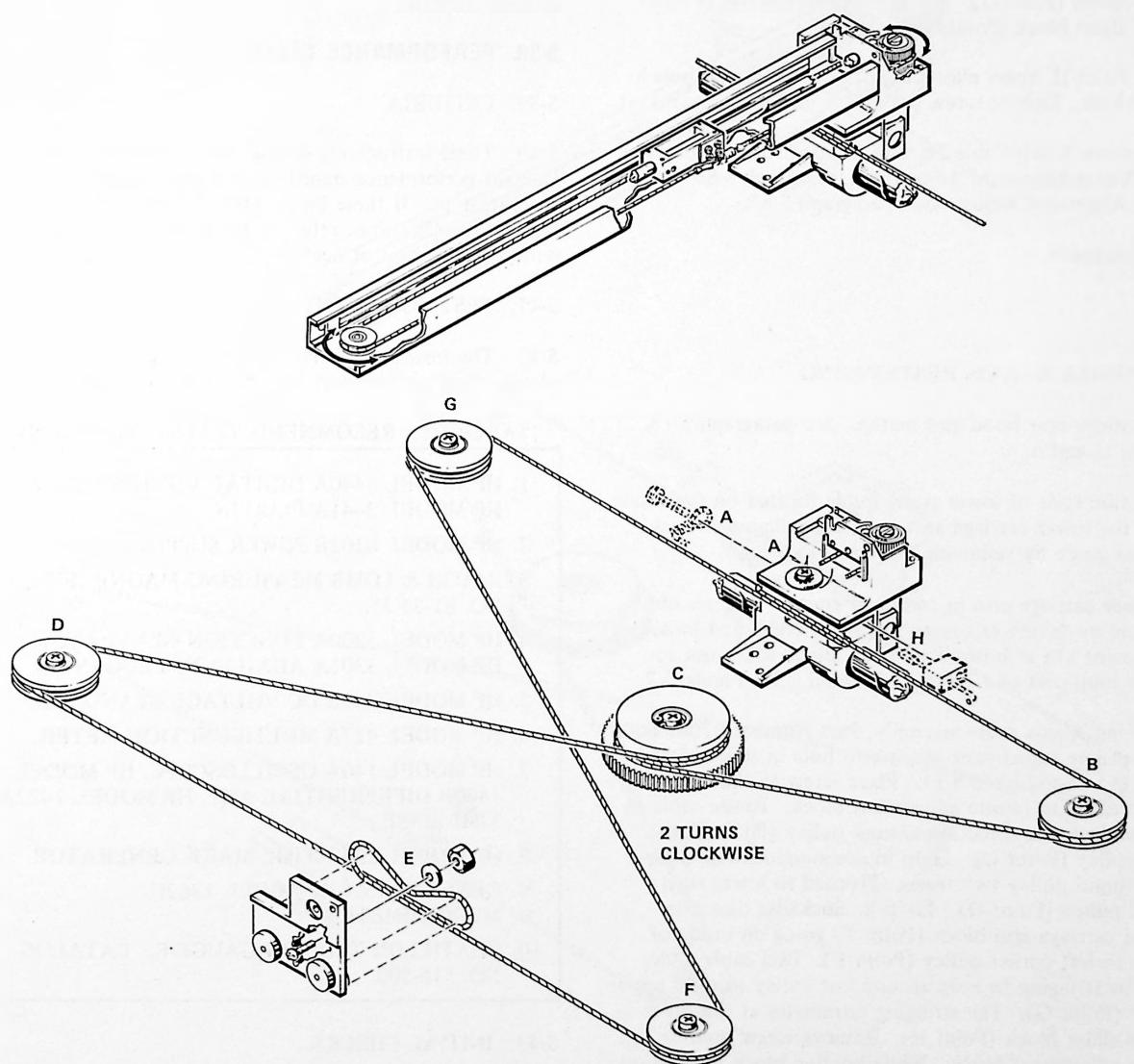


Figure 5-10. X and Y-Axis Restraining, 7044A Model

d. Using X-axis cable assembly, Part Number 07040-60914 attach loop around screw (Point A). See Figure 5-10. Place screw in slider block. Route cable in clockwise direction around pulley (Point B) to drive chain pulley (Point C). Loop in clockwise direction around pulley two times. Proceed to left corner pulley (Point D). Loop in clockwise direction around carriage arm block (Point E) going on outside of pulley to right corner pulley (Point F). Pass cable under previous stringing to loop around last pulley in left upper corner (Point G). The stringing terminates at other end of slider block (Point H).

e. At Point H, insert plastic adjustment block into hole in slider block. Tighten screw at Point A until stringing is taut.

f. Perform X-axis Cable Tension Adjustment, paragraph 5-79, X-axis Alignment Adjustment, paragraph 5-85, and Y-axis Alignment Adjustment, paragraph 5-87.

g. Reassemble.

#### 5-34. 7045A X-AXIS RESTRINGING.

a. Remove rear hood and platen. See paragraph 5-18, steps b, c, and d.

b. Scribe ends of lower paper guide located on front side under the lower carriage arm to make realignment easier. Remove guide by removing three screws.

c. Place carriage arm in center of travel. Remove old stringing by taking out screw on slider block and loosening adjustment nut at bottom of arm. Block slides out to expose loop part of stringing. Unwind. See Figure 5-7.

d. Using X-axis cable assembly, Part Number 07041-60009 insert plastic adjustment block into hole in slider block (Point A). See Figure 5-11. Place screw in slider block and thread into plastic adjustment block. Route cable in counterclockwise direction around pulley (Point B) to drive pulley (Point C). Loop in counterclockwise direction around pulley two times. Proceed to lower right corner pulley (Point D). Loop in clockwise direction around carriage arm block (Point E) going on inside of pulley to left corner pulley (Point F). Pass cable under previous stringing to loop around last pulley in right upper corner (Point G). The stringing terminates at the other end of slider block (Point H). Remove screw holding plastic adjustment block. While holding block in position, insert screw through cable loop and into slider block.

e. Tighten screw at Point A until stringing is taut.

f. Perform X-axis Cable Tension Adjustment, paragraph 5-79, X-axis Alignment Adjustment, paragraph 5-85, and Y-axis Alignment Adjustment, paragraph 5-87.

g. Reassemble.

### 5-35. ELECTRICAL MAINTENANCE.

#### 5-36. REQUIREMENTS.

5-37. The 7044A and 7045A Models require minimum electrical maintenance. They are carefully aligned during manufacture. However, if these recorders ever require alignment, specific adjustment procedures are detailed in this section. Section VII, Troubleshooting, contains additional material.

#### 5-38. PERFORMANCE TESTS.

#### 5-39. CRITERIA.

5-40. These instruments should meet the following Hewlett-Packard performance standards to assure operation within specifications. If these instruments fail to meet the following test specifications, refer to Adjustment Procedures within this section or Section VII, Troubleshooting.

#### 5-41. TEST EQUIPMENT.

5-42. The instruments and accessories required for completing these performance tests are listed in Table 5-1.

TABLE 5-1. RECOMMENDED TEST EQUIPMENT

1. HP MODEL 3440A DIGITAL VOLTMETER WITH HP MODEL 3441A PLUG-IN.
2. HP MODEL 6202B POWER SUPPLY.
3. BAUSH & LOMB MEASURING MAGNIFIER NO. 81-34-35.
4. HP MODEL 3300A FUNCTION GENERATOR (2), HP MODEL 3301A AUXILIARY PLUG-IN (2).
5. HP MODEL 740B DC VOLTAGE STANDARD.
6. HP MODEL 427A MULTIFUNCTION METER.
7. HP MODEL 140A OSCILLOSCOPE, HP MODEL 1400B DIFFERENTIAL AMP, HP MODEL 1422A TIME BASE.
8. HP MODEL 226A TIME MARK GENERATOR.
9. GENERAL RADIO MODEL 1862C MEGOHMMETER.
10. CHATILLON TENSION GAUGE-R. CATALOG NO. 516-500.

#### 5-43. INITIAL CHECKS.

##### 5-44. To perform initial checks:

- a. Position voltage selector switch to 115 or 230 volts. Insert power cord.
- b. Position POLARITY switches to +RT (X-axis) +UP (Y-axis).
- c. Switch on LINE, CHART, SERVO, and PEN.

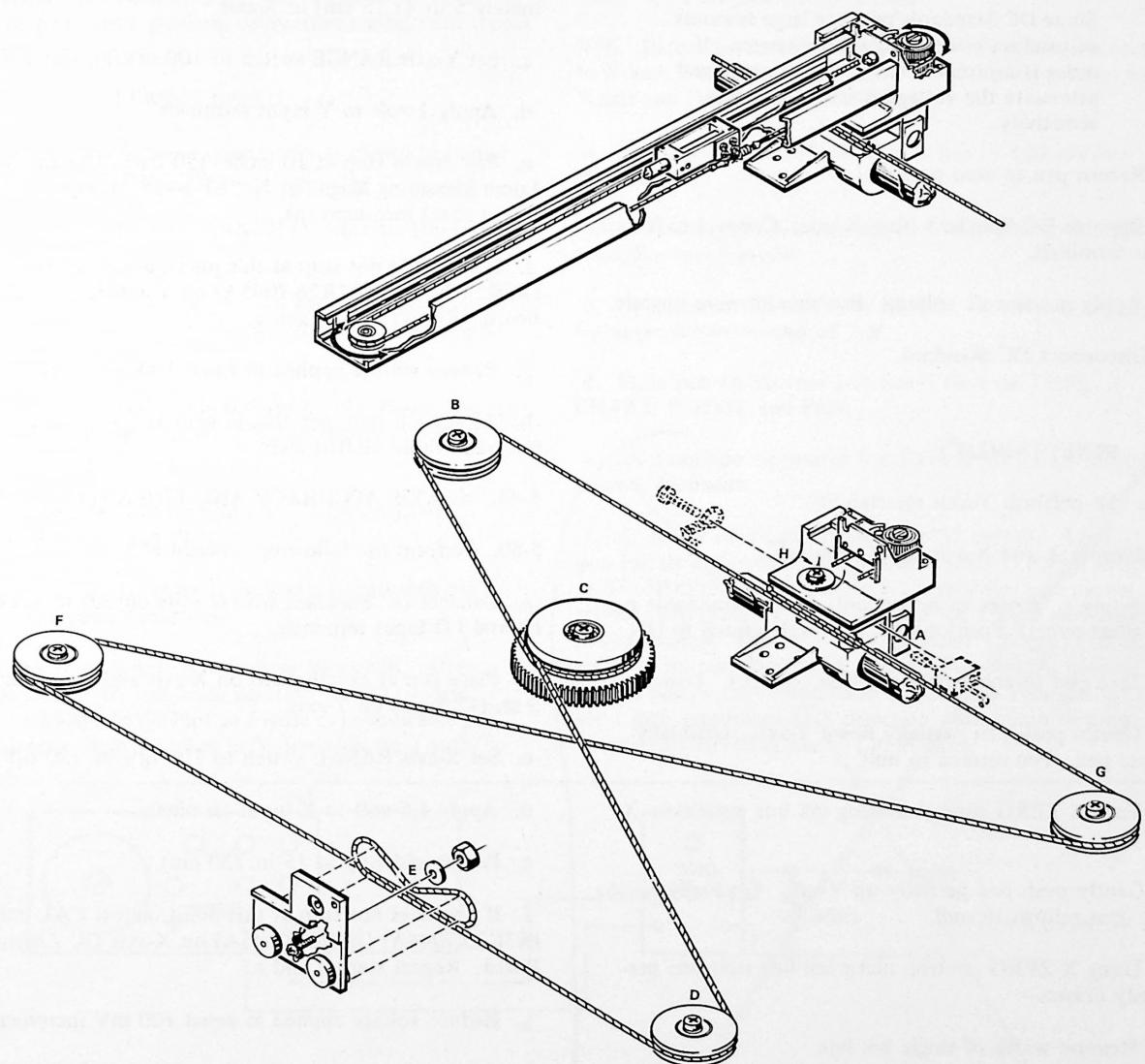


Figure 5-11. X and Y-Axis Restrung, 7045A Model

d. Connect DC Standard to X-axis HI and LO input terminals.

e. Apply positive dc voltage. Pen moves upscale.

#### NOTE

Some DC Standards produce large amounts of random noise on low-level ranges. If noise is a problem, use a higher range and attenuate the voltage down to recorder sensitivity.

f. Return pen to zero position.

g. Remove DC Standard from X-axis. Connect to Y-axis input terminals.

h. Apply positive dc voltage. Pen should move upscale.

i. Disconnect DC Standard.

#### 5-45. RESETTABILITY.

5-46. To perform Y-axis resettability:

a. Jumper X and Y-axis input terminals.

b. Apply ac power to instrument. Install disposable pen and chart paper. Position SERVO toggle switch to ON.

c. Zero pen to convenient position on chart. Lower pen.

d. Gently push pen partially down Y-axis. Gradually release pen. Pen returns to null.

e. Turn X ZERO control making ink line parallel to X-axis.

f. Gently push pen partially up Y-axis. Gradually release pen. Pen returns to null.

g. Using X ZERO control, make ink line over line previously drawn.

h. Measure width of single ink line.

i. Measure distance between outer edges of retraced line.

j. Difference between width of single and retraced lines should be less than 0.010 inch (0.25 millimeter). If over this amount, check mechanical freedom (see paragraph 5-15) and Y-axis amplifier gain (see paragraph 5-96).

k. Repeat steps a through i for X-axis resettability and verify that differences between width of single and retraced lines are less than 0.015 inch (0.38 millimeter).

#### 5-47. Y-AXIS ACCURACY AND LINEARITY.

5-48. To perform this test:

a. Connect DC Standard with 0 volts output to Y-axis HI and LO input terminals.

b. Place pen at exactly on zero on Y-axis and approximately 5 in. (12.5 cm) in X-axis.

c. Set Y-axis RANGE switch to 100 mV/in. (50 mV/cm).

d. Apply 1 volt to Y input terminals.

e. Pen should stop at 10 inches (20 cm). Use Bausch & Lomb Measuring Magnifier No. 81-34-35, or equivalent, for an exact measurement.

f. If pen does not stop at this point, adjust CAL control (A2R23-7044A) (A2R26-7045A) on Y-axis DC Amplifier Board. Repeat steps d and e.

g. Reduce voltage applied in equal 100 mV increments.

h. After each step, pen should stop at 1 inch (2 cm) intervals within  $\pm 0.010$  inch.

#### 5-49. X-AXIS ACCURACY AND LINEARITY.

5-50. Perform the following procedure:

a. Connect DC Standard with 0 volts output to X-axis HI and LO input terminals.

b. Place pen at exactly zero on X-axis and approximately 5 in. (12.5 cm) on Y-axis.

c. Set X-axis RANGE switch to 100 mV/in. (50 mV/cm).

d. Apply 1.5 volt to X input terminals.

e. Pen should stop at 15 in. (30 cm).

f. If pen does not stop at this point, adjust CAL control (A3R23-7044A) (A3R24-7045A) on X-axis DC Amplifier Board. Repeat steps d and e.

g. Reduce voltage applied in equal 100 mV increments.

h. After each step, pen should stop at 1 inch (2 cm) intervals with  $\pm 0.015$  inch.

#### 5-51. INPUT RESISTANCE.

5-52. To check X and Y axis, perform the following steps:

a. Connect 1 meg  $\pm 1\%$  precision resistor in series with X-axis HI input terminal.

b. Apply 1.5 volts from DC Standard to X input terminals.

- c. Pen should move 7.5 inches rather than full scale.
- d. Disconnect DC Standard and 1 meg resistor and connect to Y-axis terminals. Apply 1 volt to Y input terminals.
- e. Pen should move 5 inches rather than full scale.
- f. If error more than  $\pm 0.38$  in. on X-axis or  $\pm 0.25$  in. on Y-axis of pen travel, perform calibration check, then repeat procedure.

#### 5-53. Y-AXIS SLEWING SPEED.

5-54. Make the following connection as shown in Figure 5-12 before performing this test.

- a. Set X-axis and Y-axis RANGE switches to 100 mV/in. (50 mV/cm).
- b. Set Function Generator to 0.5 Hz triangular wave output and amplitude to full counterclockwise. Connect to X-axis.
- c. Open switch S1 on Power Supply. Set Power Supply for output of approximately 2 V for 7044A or 7045A test. Connect to Y-axis.
- d. Place pen on bottom grid line. Turn on LINE, CHART, SERVO, and PEN.
- e. Set Function Generator on X-axis for 10 inch  $\pm 0.1$  inch peak-to-peak excursion.
- f. At center of X-axis travel, close S1 switch. After pen has slewed to full scale position SERVO toggle switch to STANDBY. Plot in Figure 5-14 indicates pen moves greater than 2 inches in Y direction for 1 inch movement in X direction. Minimum slewing speed = (slope) ( $10$  in./sec =  $20$  in./sec) for 7044A Model. For 7045A, plot indicates pen moves greater than 3 inches in Y direction for 1 inch movement in X direction. Minimum slewing speed = (slope) ( $10$  in./sec) = ( $30$  in./sec).

movement in X direction. Minimum slewing speed = (slope) ( $10$  in./sec =  $20$  in./sec) for 7044A Model. For 7045A, plot indicates pen moves greater than 3 inches in Y direction for 1 inch movement in X direction. Minimum slewing speed = (slope) ( $10$  in./sec) = ( $30$  in./sec).

#### 5-55. X-AXIS SLEWING SPEED.

5-56. Before performing this procedure, exchange sources to X and Y axis inputs. Connect Function Generator to Y-axis and Power Supply to X-axis.

- a. Set X- and Y-axis RANGE switches to 100 mV/in. (50 mV/cm).
- b. Set Function Generator applied to Y axis to 0.5 Hz triangular wave output.
- c. Open switch S1 on Power Supply. Set Power Supply for approximate output of 2 V.
- d. Place pen on bottom grid line. Turn on LINE, CHART, SERVO, and PEN.
- e. Set Function Generator for 10 inch  $\pm 0.1$  inch peak-to-peak excursion.
- f. At center of Y-axis travel, close S1 switch. After arm has slewed to full scale, position SERVO toggle switch to STANDBY. Plot in Figure 5-14 indicates pen moves greater than 2 inches in Y direction for 1 inch movement in X direction. Minimum slewing speed = (slope) ( $10$  in./sec =  $20$  in./sec) for 7044A Model. For 7045A, plot indicates pen moves greater than 3 inches in Y direction for 1 inch movement in X direction. Minimum slewing speed = (slope) ( $10$  in./sec) = ( $30$  in./sec).

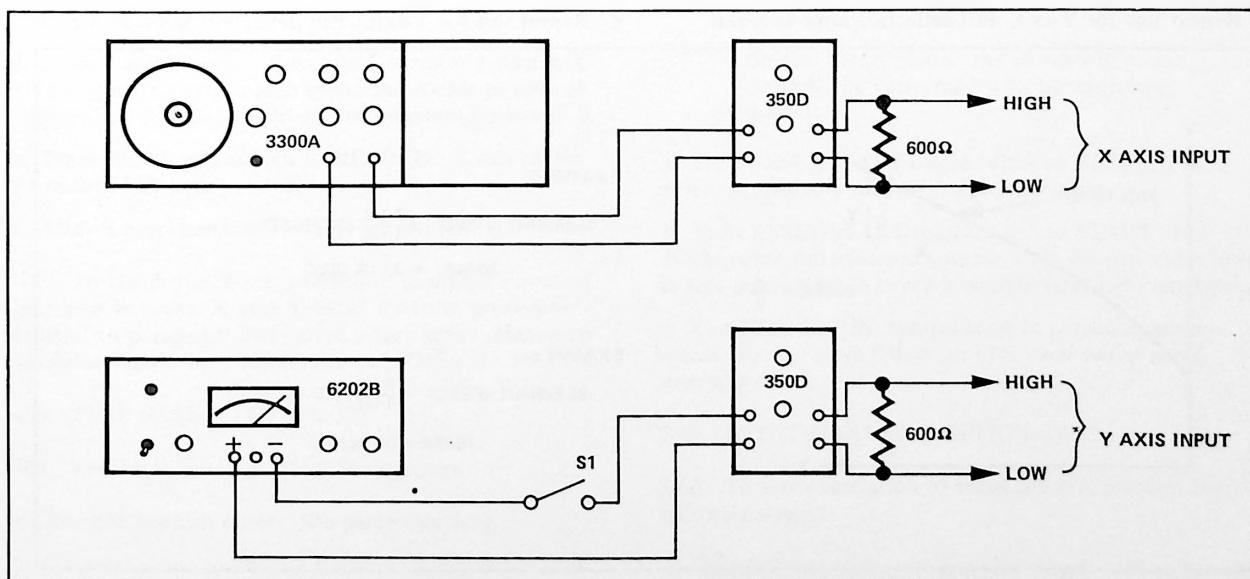
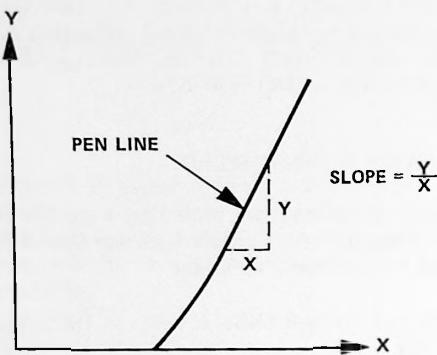


Figure 5-12. Y-Axis Slewing Speed Test Setup



EXAMPLE:

$$\text{SLEWING SPEED} = \frac{2 \text{ IN.}}{1 \text{ IN.}} (10 \text{ IN./SEC})$$

$$7044A = 20 \text{ IN./SEC}$$

EXAMPLE:

$$\text{SLEWING SPEED} = \frac{3 \text{ IN.}}{1 \text{ IN.}} (10 \text{ IN./SEC})$$

$$7045A = 30 \text{ IN./SEC}$$

Figure 5-13. Y-Axis Slewing Speed – 7044A and 7045A Models

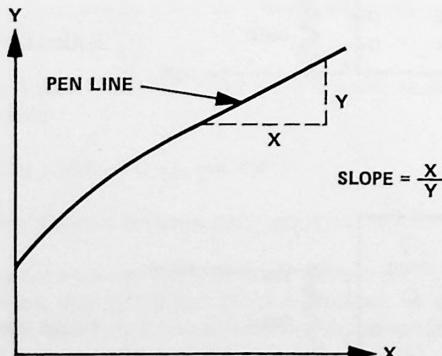
#### 5-57. COMMON MODE REJECTION.

#### 5-58. DC CMR.

- a. Connect 1k resistor between HI and LO input terminals on both axes.
- b. Connect DC Standard between X-axis LO input terminal and ground.
- c. Set X-axis RANGE switch to 0.5 mV/inch.
- d. Set DC Standard to 500 V.
- e. Pen deflection shall not exceed  $3.2 \text{ IN. (6.4 cm)}$  with pen at any position on paper.
- f. Repeat test for Y-axis. Pen deflection same as X-axis.

#### 5-59. AC CMR.

- a. Connect 1k resistor between HI and LO input terminals on both axes.
- b. Connect Function Generator between LO terminal of X-axis and ground. Connect multifunction meter to output of Function Generator.
- c. Set X-axis RANGE switch to 0.5 mV/inch.
- d. Set Function Generator to 10.5 V RMS (30 V p-p) 60 Hz sine wave.
- e. Pen deflection shall not exceed  $10.9 \text{ IN. (3.8 cm)}$  with pen at any position on paper.
- g. Repeat test for Y-axis. Pen deflection same as X-axis.



EXAMPLE:

$$\text{SLEWING SPEED} = \frac{2 \text{ IN.}}{1 \text{ IN.}} (10 \text{ IN./SEC})$$

$$7044A = 20 \text{ IN./SEC}$$

EXAMPLE:

$$\text{SLEWING SPEED} = \frac{3 \text{ IN.}}{1 \text{ IN.}} (10 \text{ IN./SEC})$$

$$7045A = 30 \text{ in./sec}$$

Figure 5-14. X-Axis Slewing Speed – 7044A and 7045A Models

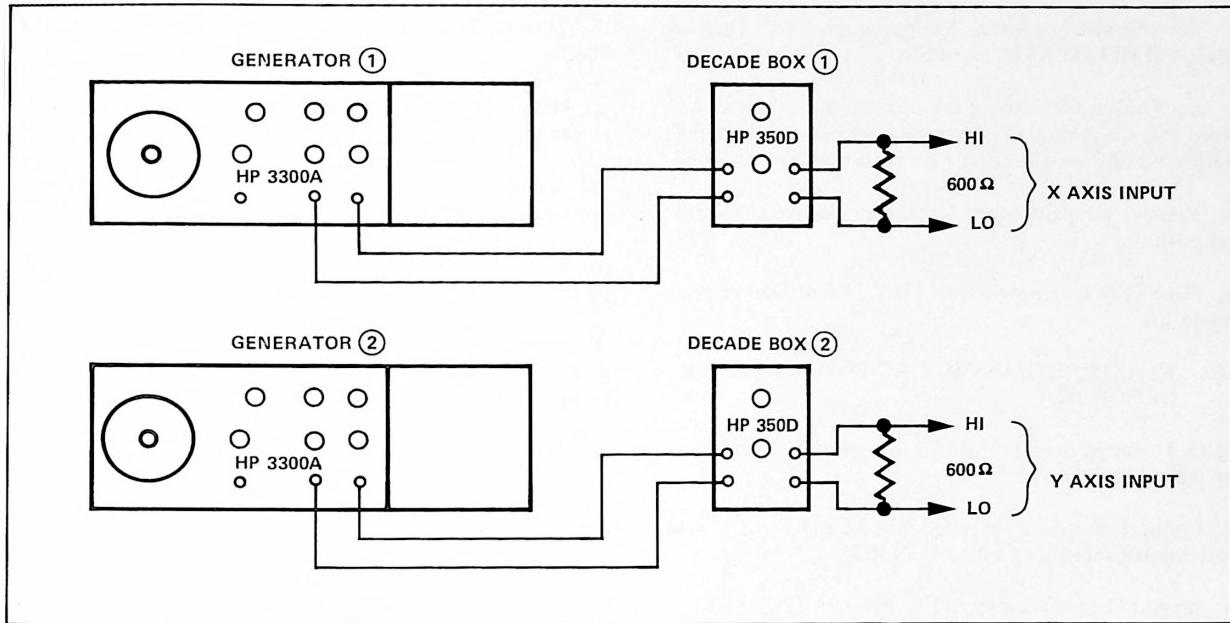


Figure 5-15. Overshoot Test Setup

#### 5-60. OVERSHOOT.

5-61. To check the X-axis overshoot, first make the connections as shown in Figure 5-15.

- Set X and Y-axis RANGE switches to 100 mV/in. (50 mV/cm).
- Set Function Generator 1 to 0.5 Hz, square wave, and amplitude to full counterclockwise.
- Set Function Generator 2 for a triangular wave and amplitude to full counterclockwise.
- Adjust amplitude on Function Generator 1 setting X-axis to approximately 7-inch span. Set Y-axis to span of 7 inches by adjusting amplitude on Function Generator 2.
- Place PEN toggle switch to RECORD. Y-axis moves 1/2 cycle. Lift pen.
- Max. X-axis overshoot: 7044A 0.3 in.; 7045A 0.15 in.

5-62. To check the Y-axis overshoot, exchange Function Generator between X and Y axis. Perform procedure identical to paragraph 5-61, steps a through e. Maximum overshoot should be: 7044A 0.2 in.; 7045A 0.1 in.

#### 5-63. TIME BASE – OPTION 001.

5-64. To check, perform the following steps:

- Remove bottom cover. See paragraph 5-18.
- Connect scope to SWEEP INDICATION (output from Rear Input Connector, Pin 29 referenced to ground, Pin 20).

- Using ZERO controls, place pen to far left of grid line.
- Place Time Base selector knob in X or Y position.
- Set TIME-SEC/IN. control knob to one of six sweep speeds.
- Place RESET/START toggle switch to START position. Pen should sweep across X or Y axis at correct speed. Monitor SWEEP INDICATION on scope for +5 V level when sweeping.

#### NOTE

On the 7045A Model, the sweep will automatically be performed with the response slowed.

- Press RESET/START toggle switch to RESET. Pen should lift and return to original start position.
- Press RESET/START toggle switch to START. Pen should sweep full scale and automatically lift pen and return to zero position when sweep is completed at right hand stop.
- Run TIME-SEC/IN. control knob to remaining sweep speeds. Repeat steps f through i for each sweep speed selection.

#### 5-65. EVENT MARKER – OPTION 002.

5-66. To verify operation of event marker, perform the following steps:

- Install Event Marker in provided plug-in slot at top of Y arm.

b. Remove bottom cover. See paragraph 5-18. Turn on LINE, CHART, SERVO, and PEN.

c. For Option 007, Rear Connector, connect jumper between Pin 1 and ground. Event Marker pen should deflect sharply upward on the chart (Y direction) when activated.

d. Remove jumper. Event Marker should return to original position.

e. Place PEN toggle switch to LIFT. Event Marker pen should lift.

**5-67. X-AXIS RETRANSMITTING POTENTIOMETER – OPTION 003.**

5-68. To verify operation within specifications, perform the following steps:

a. Connect ohmmeter between pins 34 and 32 of J1 (the Rear Input Connector) F.S. and ZERO.

b. Measured resistance should be between 18.2k and 20.2k.

c. Disconnect and reconnect between F.S. and WIPER (pins 34 and 33 of J1).

d. Slowly move X arm to extreme left while watching ohmmeter. Resistance should increase smoothly and uniformly without jumps. Return X arm smoothly toward right. Resistance should decrease smoothly.

e. Disconnect and reconnect between terminal lugs ZERO and WIPER (pins 32 and 33 of J1).

f. Perform step e but with phase difference. Greatest resistance should be measured with X arm at full scale position (to right).

**5-69. Y-AXIS RETRANSMITTING POTENTIOMETER – OPTION 004.**

5-70. To verify performance of this option, perform the following steps:

a. Connect ohmmeter between pins 16 and 14 of J1 (the Rear Input Connector) F.S. and ZERO.

b. Measured resistance should be between 12.5k and 13.8k.

c. Repeat procedure described in paragraph 5-68, steps d through g, but with Pin 14 (ZERO), Pin 15 (WIPER), and Pin 16 (FULL SCALE).

**5-71. TTL – OPTION 005.**

5-72. To verify performance:

a. Short input terminals.

b. Turn on LINE and switch to FAST response if Model 7045A.

c. Make connection between Pin 4 and Pin 20 (ground) to energize servos.

d. X and Y-axis servos unmuted (servo motors should drive pen to null).

e. Place recording paper onto recording table. It should be easy to move paper in any direction.

f. Connect jumper between Pin 3 and Pin 20 (ground) of J1 (Rear Input Connector). Chart paper should now be held firmly in place.

g. Also make following TTL checks if Model 7045A:

1. Connect jumper between Pin 5 and Pin 20 (ground) of Rear Input Connector.

2. Grasp recording arm toward top and notice force required to move recording arm from null in either X direction. It should be rather easy to move and return to null rather slowly. Remove jumper from the Rear Input Connector and force and speed of the X arm should increase.

3. Connect jumper between Pin 6 and Pin 20 (ground) of Rear Input Connector.

4. Grasp metal portion of the pen holder and displace in either direction in Y axis. Force required to move from null should be minimal and speed of return to null rather slow. Remove jumper and force and speed of the Y axis should increase for fast response.

**5-73. MECHANICAL ADJUSTMENTS.**

**5-74. PROCEDURE.**

5-75. Any adjustments to the 7044A and 7045A is deemed necessary only when it is determined the models are out of adjustment per specifications, but not malfunctioning due to component failure.

**5-76. Y-AXIS DRIVE STRING TENSION ADJUSTMENT.**

5-77. The tension on the Y-axis string should be enough to stall the Y motor when the pen carriage is driven off-scale. If cable slips:

a. Remove disposable pen. Remove Rear Hood Assembly, platen, and bottom paper guide. See paragraph 5-18.

b. Move Y arm to access hold in frame.

c. Insert Phillips POZIDRIV screwdriver through access hole from circuit board side of mainframe and loosen screw holding bottom Y arm pulley in place.

d. Flip Y scale from over bottom pulley.

- e. Remove screw at bottom end of pen scale (0). Carefully move Y slider rod to one side to allow clearance.
- f. Turn eccentric bottom pulley stud with wrench to tighten cable as required.
- g. Retighten screw on pulley stud.
- h. Recheck cable tension. If correct, install paper guide and realign X-axis (see paragraph 5-84).
- i. If not correct, repeat steps e, f, and g.
- j. Reassemble recorder.

#### 5-78. X-AXIS CABLE TENSION ADJUSTMENT.

5-79. The X-axis cable tension should be verified by measuring the force required to displace it at a given distance. With the arm at the extreme right, pull down at the center of the section of cable adjacent to the X slider rod until it deflects 1/2 in. from relaxed position. The scale should be measured between 6 and 9 ounces for 7044A and 1.5 pounds for 7045A. See Figure 5-16. If the tension does not fall within these limits, loosen or tighten screw on X-axis slider block and perform Y-axis alignment, paragraph 5-87. See Figure 5-7.

#### 5-80. Y GEAR TRAIN BACKLASH ADJUSTMENT.

5-81. The backlash of the pen gear drive system is adjusted as follows:

- a. Remove disposable pen. Remove rear hood, bottom cover, and platen. See paragraph 5-18. Remove pen lift bar. See paragraph 5-24 and Figure 5-4.

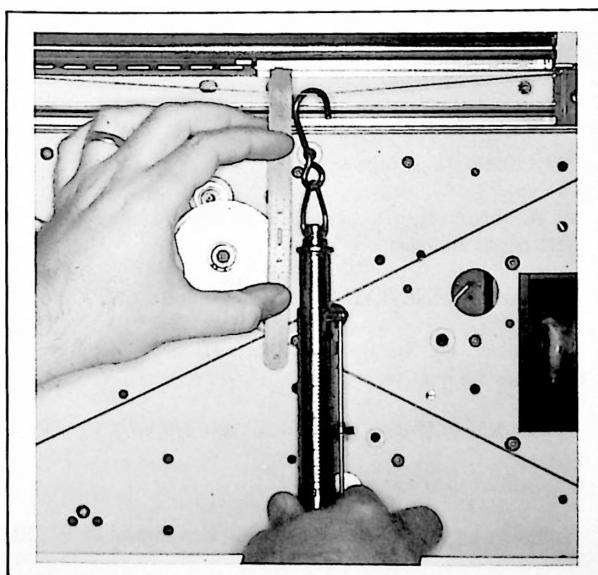


Figure 5-16. X-Axis Cable Tension Check

- b. Stand recorder on side (Y servo motor up). Slide carriage arm to extreme left.
- c. Loosen screw holding clamp to motor.
- d. Rotate motor slightly, first in one direction, then the other, until motor pinion rotates freely with minimum backlash.
- e. Tighten motor clamping screw. Recheck and repeat steps c and d if backlash is incorrect.
- f. Reassemble recorder.

#### 5-82. X GEAR TRAIN BACKLASH.

5-83. Backlash of the gear drive system is adjusted as follows:

- a. Remove disposable pen. Remove Rear Hood, bottom cover, and platen. See paragraph 5-18.
- b. Loosen screw holding clamp to motor on 7044A instrument. On 7045A loosen two screws holding motor to casting.
- c. Rotate motor slightly until motor pinion rotates freely with minimum backlash.
- d. On 7044A, tighten motor clamping screw. Retighten two screws on 7045A.
- e. Recheck and repeat steps b and c if backlash is incorrect.
- f. Reassemble recorder.

#### 5-84. X-AXIS ALIGNMENT ADJUSTMENT.

5-85. If the horizontal pen trace deviates from correctly aligned paper grid, adjust as follows:

- a. Remove disposable pen. Remove Rear Hood and platen. See paragraph 5-18.
- b. Loosen three Phillips screws holding paper stop bar after scribing ends of bar to index position. See Figure 5-17. Adjust bar, depending upon initial deviation of pen trace, forward or backward. Use scribed marks as reference.
- c. Tighten screws on paper stop.
- d. Replace platen (do not screw down). Place piece of chart paper on platen. Replace disposable pen. Make trace. If not aligned, repeat steps a, b, and c.
- e. When X-axis is correctly aligned, perform Y-axis alignment. See paragraph 5-87.

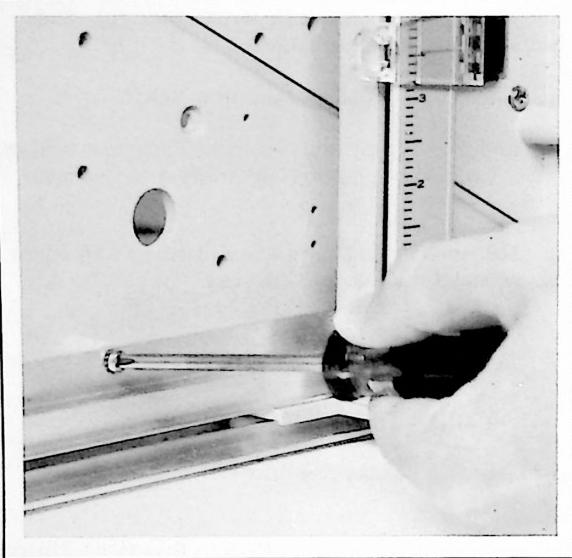


Figure 5-17. X-Axis Alignment Adjustment

#### 5-86. Y-AXIS ALIGNMENT ADJUSTMENT.

5-87. If the vertical pen trace deviates from correctly aligned paper grids, but horizontal alignment is correct, proceed as follows:

- a. Remove disposable pen. Remove Rear Hood, bottom cover, and platen. See paragraph 5-18.
- b. Stand recorder on front side. Slide carriage to extreme right. Line up upper end of pen arm with access hole provided. See Figure 5-18. Rear of recorder at bottom of pen arm provides accessibility and visibility.
- c. Loosen large screw at top of slider block. Loosen nut clamping cable through provided hole. See Figure 5-18.
- d. Replace platen (do not screw down). Place piece of chart paper on platen. Replace disposable pen. Make trace. If not aligned, twist arm until trace is in exact alignment with recording paper.
- e. Tighten nut to clamp cable in position. Recheck alignment. If not exact, repeat step d.
- f. Remove platen. Tighten screw at top of arm. Slide arm back and forth checking for freedom. If binding, loosen screw again. Vibrate arm slightly to center slider bearing. Retighten screw and repeat until arm is free.
- g. Reassemble recorder.

#### 5-88. PEN LIFT ADJUSTMENT.

5-89. Use the following procedure to align the pen lift:

- a. Remove disposable pen and top hood over lift mechanism.

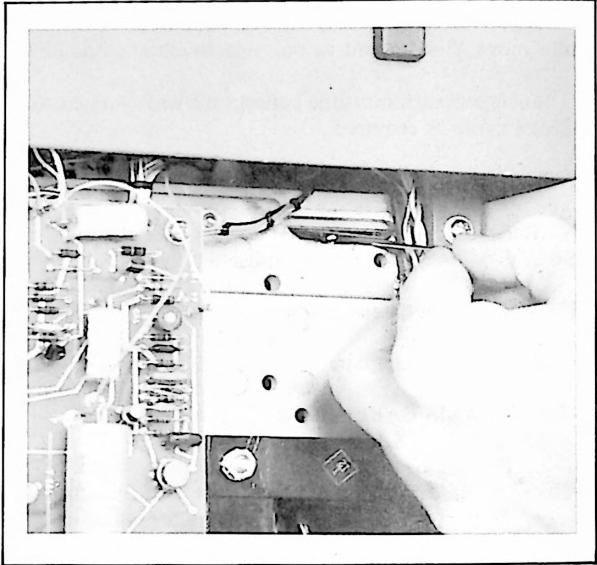


Figure 5-18. Y-Axis Alignment Adjustment

b. Pen lift solenoid assembly is mounted over left side of pen lift bar.

c. Manually press solenoid closed and check clearance between plastic bumper on Y axis scale and pen lift bar. There should be clearance with the recording arm in any position. But if clearance is excessive, pen will not lift far enough off chart paper.

d. To adjust, loosen two screws holding solenoid bracket and reposition until desired clearance is obtained. Tighten screws.

e. Replace hood and disposable pen.

#### 5-90. ELECTRICAL ADJUSTMENTS.

##### 5-91. CALIBRATION ADJUSTMENT.

5-92. Calibrate as follows:

- a. Remove bottom cover. See paragraph 5-18. Install chart paper and pen.
- b. Turn on LINE, CHART, SERVO, and PEN.
- c. Connect DC Standard to X-axis HI and LO input terminals. Adjust to 0 volts.
- d. Set X axis RANGE switch to 100 mV/in. (50 mV/cm).
- e. Position pen exactly at zero.
- f. Apply 1.5V to X input terminals; pen moves 15 in.(30 cm)
- g. Adjust CAL control (A3R22-7044A) (A3R24-7045A) on X-axis DC Amplifier Board. See Figure 5-19.

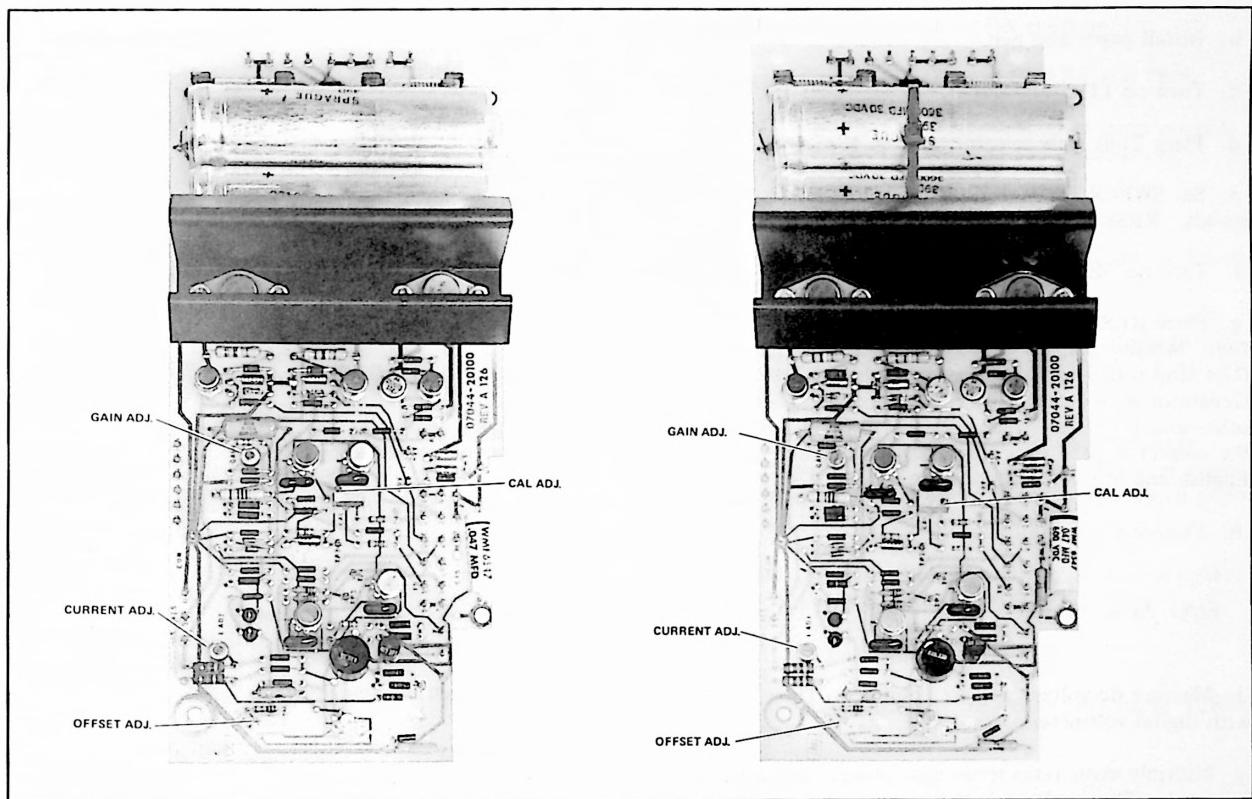


Figure 5-19. Calibration Adjustment

- h. Remove signal from X input terminals.
- i. Connect DC Standard to Y-axis HI and LO input terminals. Adjust to 0 volts.
- j. Set Y-axis RANGE switch to 100 mV/in. (50 mV/cm).
- k. Position pen exactly at zero.
- l. Apply 1V to Y input terminals; pen moves 10 in.(20 cm).
- m. Adjust CAL control (A2R22-7044A) (A2R26-7045A) on Y-axis DC Amplifier Board. See Figure 5-19.
- n. Remove DC Standard.

#### 5-93. INPUT OFFSET ADJUSTMENT.

5-94. Perform the following adjustments:

- a. Remove bottom cover. See paragraph 5-18.
- b. Connect jumper between HI and LO input terminals of both axes. *See Change*
- c. On X-axis Amplifier Board, measure voltage between TP1 and circuit common using a Digital Voltmeter. Adjust potentiometer marked OFFSET until voltage is  $0\text{ V} \pm 10\text{ mV}$ . See Figure 5-19.

- d. Remove jumper from X-axis input terminals.

e. Adjust potentiometer marked I ADJ on X-axis Amplifier Board until voltage at TP1 returns to  $0\text{ V} \pm 10\text{ mV}$ . See Figure 5-19.

- f. Repeat same procedure for Y-axis.

#### 5-95. GAIN ADJUSTMENT.

5-96. A potentiometer marked GAIN is provided on each Amplifier Board. Normal setting is in center of adjustment span. If axis fails resetability specification (see paragraph 5-45, Resetability) increase gain by turning GAIN potentiometer clockwise. If servo oscillates, turn potentiometer counterclockwise to decrease amplifier gain. See Figure 5-19.

#### 5-97. TIME BASE CALIBRATION ADJUSTMENT.

5-98. X-AXIS ADJUSTMENT. The calibration of the time base sweep option (Option 001) is established at the factory and should remain within specifications without recalibration. However, if adjustment is required to the X-axis due to deviation from the accuracy specifications, proceed as follows:

- a. Remove bottom cover. See paragraph 5-18.

- b. Install paper and pen.
- c. Turn on LINE and CHART.
- d. Place Time Base selector knob in X position.
- e. Set SWEEP RATE control knob to one of six sweep speeds. RESET/START toggle switch in START position.
- f. Turn on SERVO and PEN.
- g. Place RESET/START toggle switch to START position. Measure elapsed time for a 15-inch (38 cm) sweep. (Use stop watch for slow sweep speeds, or Time Mark Generator with better than  $\pm 1\%$  accuracy applied to the other axis for faster sweep speeds.) Table 5-2 contains the correct elapsed time for each selected sweep speed; English and Metric. Do not adjust unless over 1% error.
- h. Compute error ratio:

$$\text{Error Ratio} = \frac{\text{Measured Sweep Time}}{\text{Correct Sweep Time}}$$

- i. Measure dc voltage at Test Point 1 on Time Base Board with digital voltmeter.
- j. Multiply error ratio times voltage measurement made in step k. The resultant is the correction voltage.

$$\text{Correction Voltage} = (\text{Error Ratio}) (\text{Voltage Measured})$$

- k. Adjust sweep calibration until digital voltmeter reads correction voltage. Sweep speed is now adjusted. As an example:

- 1. Position TIME-SEC/IN. control knob to 10 sec/in. sweep speed.

- 2. Elapsed time for 15 inch sweep was measured as exactly 147 seconds.

$$\begin{aligned} 3. \text{ Correct Sweep Time} &= (\text{Sweep Speed}) (\text{Length of Axis}) \\ &= (10 \text{ sec/in.}) (15 \text{ in.}) \\ &= 150 \text{ seconds.} \end{aligned}$$

$$\begin{aligned} 4. \text{ Error Ratio} &= \frac{\text{Measured Sweep Time}}{\text{Correct Sweep Time}} \\ &= \frac{147 \text{ seconds}}{150 \text{ seconds}} \\ &= 0.98 \end{aligned}$$

- 5. Voltage measured at Test Point 1 on Time Base Board with digital voltmeter is 1.055 volts.

$$\begin{aligned} 6. \text{ Correction Voltage} &= (\text{Error Ratio}) (\text{Voltage Measured}) \\ &= (0.98) (1.055 \text{ volts}) \\ &= 1.033 \text{ volts.} \end{aligned}$$

- 7. Adjust sweep speed calibration at Test Point 1 on Time Base Board until reading is 1.033 volts.

- 8. Sweep speed is now adjusted.

- 5-99. Y-AXIS ADJUSTMENT. To adjust the Y-axis, proceed as follows:

- a. Connect Time Mark Generator to X-axis input terminals. Set control knob to 1 sec/pulse.
- b. Place Time Base selector knob in Y position.
- c. Position X-axis RANGE switch to 10 V/inch.
- d. Position SWEEP RATE control knob to 1 sec/in. (5 sec/cm).

TABLE 5-2. TIME BASE CALIBRATION REQUIREMENTS

SWEEP SPEED (SECONDS/INCH)	ELAPSED TIME FOR 15 IN. SWEEP (SECONDS)	MAXIMUM DEVIATION (SECONDS)
0.5	7.5	$\pm 0.075$
1	15	$\pm 0.15$
5	75	$\pm 0.75$
10	150	$\pm 1.5$
50	750	$\pm 7.5$
100	1500	$\pm 15.0$
SWEEP SPEED (SECONDS/CENTIMETER)	ELAPSED TIME FOR 38 CM SWEEP (SECONDS)	MAXIMUM DEVIATION (SECONDS)
0.25	9.5	$\pm 0.095$
0.5	19	$\pm 0.19$
1	38	$\pm 0.38$
5	190	$\pm 1.9$
10	380	$\pm 3.8$
50	1900	$\pm 19.0$

- e. Zero pen at lower (Y-axis zero) grid line.
  - f. RESET/START toggle switch in START position.
  - g. Obtain plot of 1 second pulses along Y-axis. Make first pulse occur as close as possible to Y-axis zero grid line.
  - h. Measure distance between leading (or trailing) edges of first and tenth pulse. This distance will be approximately 8½ to 9½ inches (17 to 19 cm).
  - i. Subtract distance measured from 18 inches (36 cm).
  - j. Disconnect Time Mark Generator. Start Time Base.
  - k. Pen will be stopped at 9 inches (18 cm) by pulling white/violet wire off Test Point 1 when pen reaches exactly 9 inches (18 cm). Use SWEEP RATE knob to slow sweep as pen nears 9 inches.
  - l. Using Y CAL potentiometer on Time Base Circuit Board, set pen at distance acquired from step i.
  - m. Reconnect white/violet wire and recheck sweep calibration in Y-axis. Repeat steps h through l, if necessary.
- 5-100. Y-AXIS LIMIT SWITCH ADJUSTMENT – 7045A.
- 5-101. To perform the adjustment:
- a. Remove bottom cover. See paragraph 5-18.
  - b. Place LINE toggle switch to ON position.
  - c. Place paper on table. Turn on CHART and PEN.
  - d. Manually move pen to uppermost Y position possible and draw a horizontal line (this is mechanical limit).
  - e. Place SERVO toggle switch to ON.
  - f. Using Y-axis ZERO control, bring pen to about 1 inch from upper Y grid boundary of paper.
  - g. By slowly turning Y-axis ZERO control, bring pen to uppermost Y position possible and draw another horizontal line (this is electrical limit line).
  - h. If this line is not approximately midway between mechanical limit line and upper Y grid boundary of paper, return pen to 1 inch from upper Y grid boundary of paper using Y-axis ZERO control.
  - i. On Y-axis Amplifier Board, adjust A2R38 (clockwise for down, counterclockwise for up).
  - j. Repeat steps g and h.
  - k. Perform above procedure for lower limit using A2R36 for adjustment.



## **SECTION VI**

### **PARTS LIST**

#### **6-1. INTRODUCTION.**

6-2. This section contains complete information on the 7044A and 7045A parts list. The lists for both models are presented in an alpha-numerical and numerical order. The procedure for ordering replacement parts for either instrument is also contained in this section.

#### **6-3. PARTS LIST.**

##### **6-4. ALPHANUMERICAL TABLE.**

6-5. Tables 6-1 and 6-4; parts list tables for the 7044A and 7045A; present the material for each model in alphabetical order of their reference designators of circuit symbols, the HP stock number of each part, the quantity (total quantity appears the first time the HP stock number appears), a five-digit manufacturer's code, and the manufacturer's part number. If a part does not have a designation, it will be listed at the end of the appropriate circuit symbol list (A1, A2, A3). At the end of the individual parts list, a code list of manufacturers is presented. This addition is a cross-reference to the five-digit code number assigned to a specific manufacturer in that the five-digit number is identified by name.

##### **6-6. MISCELLANEOUS PARTS.**

6-7. Tables 6-2 and 6-5 list those miscellaneous items not covered in the preceding tables. The items for each model will be listed by a part number, description, and quantity.

##### **6-8. CODE LIST OF MANUFACTURERS.**

6-9. Table 6-7 lists the five-digit code numbers assigned to a specific manufacturer. These tables are a cross-reference to Tables 6-1 and 6-4 in that the five-digit number listed in Tables 6-1 and 6-4 are identified by name in this table.

##### **6-10. ILLUSTRATED PARTS BREAKDOWN.**

6-11. Additional parts information is included to identify other subassemblies. This information is presented as a parts breakdown illustration with an accompanying legend. It is also divided, as the parts lists, into two parts; Part A and Part B. See Figures 6-1 through 6-4.

##### **6-12. RECOMMENDED SPARES.**

6-13. Tables 6-3 (7044A) and 6-6 (7045A) provide a listing of all components with mortality experience. Recommended quantities to stock for maintaining the models for a one-year period will be specified in the Quantity column.

##### **6-14. ORDERING INFORMATION.**

6-15. To obtain replacement parts, address order or inquiry to your local Hewlett-Packard Sales/Service Office (see insert pages at rear of manual for address of nearest HP office). The order should include part number and description used in this section, model and serial number, description of the part, and function and location of the part.

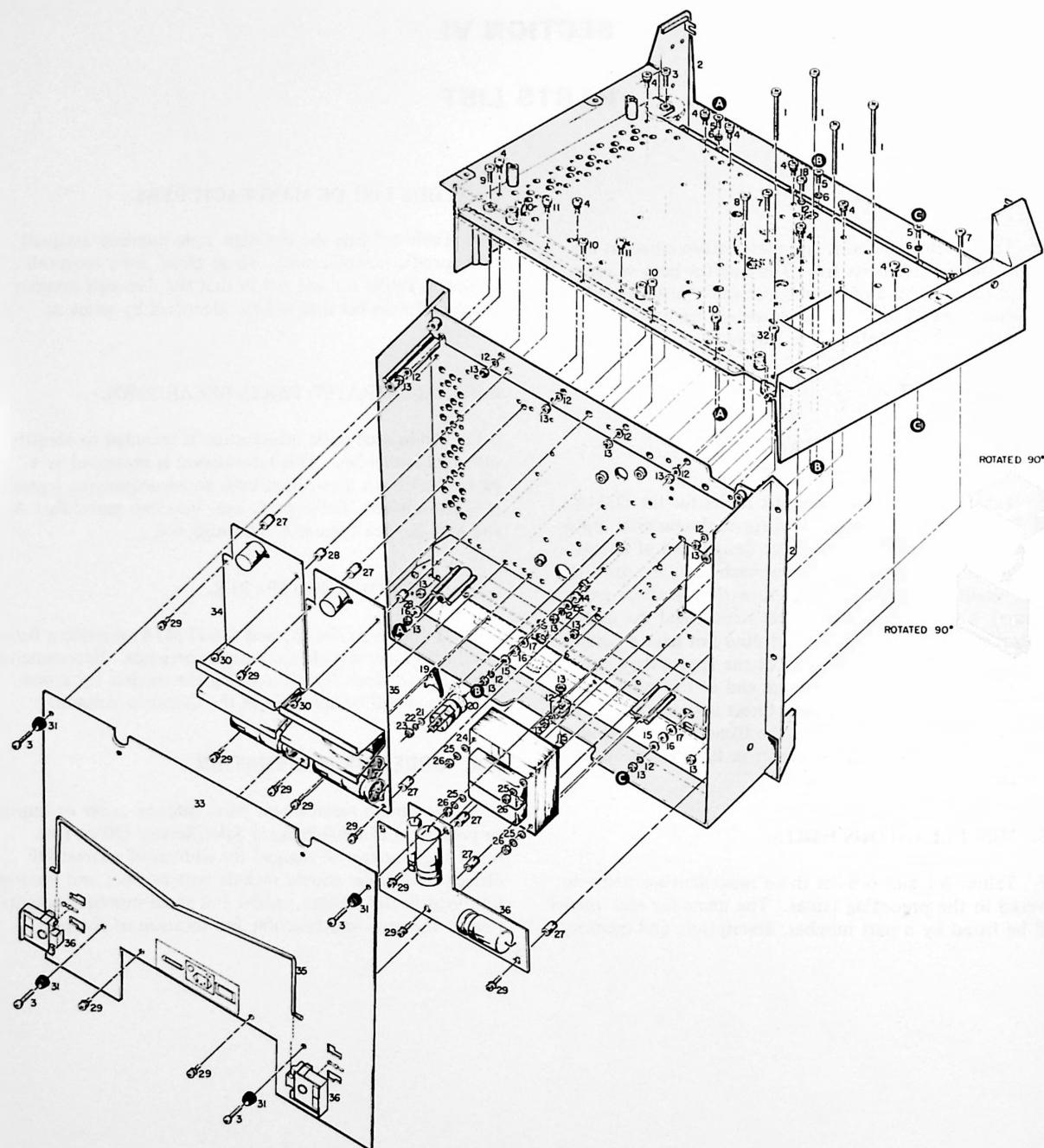


Figure 6-1. Main Frame — Model 7044A (Sheet 1 of 7)

<u>Item</u>	<u>Part No.</u>	<u>Description</u>	<u>Manufacturer</u>
1	2510-0067	Screw, Pan, Pozi, 8-32 x 2 in.	Indiana Metal Prod.
2	07040-60580	Casting, Main Frame	Hewlett-Packard
3	2510-0107	Screw, Pan, Pozi, 8-32 x 5/8	Indiana Metal Prod.
4	2360-0117	Screw, Pan, Pozi, 6-32 x 3/8	Indiana Metal Prod.
5	2360-0183	Screw, 6-32 x 3/8	Hewlett-Packard
6	2190-0179	Washer, Lock, 0.300 OD, 0.018 thk.	Shakeproof Div, ITW
7	2510-0141	Screw, Pan, Pozi, 8-32 x 14/25	Hewlett-Packard
8	2360-0205	Screw, 6-32 x 3/4	Hewlett-Packard
9	2510-0111	Screw, Pan, Pozi, 8-32 x 3/4	Indiana Metal Prod.
10	2360-0199	Screw, Pan, Pozi, 6-32 x 7/16	Indiana Metal Prod.
11	2360-0119	Screw, Pan, Pozi, 6-32 x 7/16	Indiana Metal Prod.
12	Not Used		
13	2580-0006	Nut, Hex, 8-32	Shakeproof Div, ITW
14	07040-21020	Washer, Shoulder	Hewlett-Packard
15	3050-0399	Washer, Flat, 0.375 OD, 0.032 thk.	Hewlett-Packard
16	2190-0835	Washer, Shoulder, 0.375 OD, 0.187 thk.	RCA
17	3050-0392	Washer, Flat, 0.438 OD, 0.020 thk.	Hewlett-Packard
18	2360-0197	Screw, Pan, Pozi, 6-32 x 3/8	Indiana Metal Prod.
19	07040-40040	Clamp, Servo Motor, X-axis	Hewlett-Packard
20	5060-6608	Servo Motor, X-axis	Hewlett-Packard
21	3050-0393	Washer, Flat, 0.313 OD, 0.020 thk.	Hewlett-Packard
22	2190-0105	Washer, Lock, 0.239 OD, 0.025 thk.	National Lockwasher Co.
23	2420-0016	Nut, Hex, 6-32 x 3/8	Corland Co.
24	07044-60510	Transformer, Power	Hewlett-Packard
25	2190-0009	Washer, Lock, 0.034 OD, 0.020 thk.	Thompson-Bremer & Co.
26	2580-0009	Nut, Hex, 8-32	Corland Co.
27	0380-0156	Standoff, Swaged	GOE Engineering
28	0380-0111	Standoff, Rivet	GOE Engineering
29	2360-0113	Screw, Pan, Pozi, 6-32 x 1/4	Indiana Metal Prod.
30	2360-0191	Screw, Pan, Pozi, 6-32 x 3/16	Indiana Metal Prod.
31	4003-0303	Foot, Rubber	Rubbercraft Corp.
32	2510-0111	Screw, Pan, Pozi, 8-32 x 3/4	Indiana Metal Prod.
33	07044-60630	Bottom Cover	Hewlett-Packard
34	07044-60500	Y-axis Amplifier Board	Hewlett-Packard
35	07044-60100	X-axis Amplifier Board	Hewlett-Packard
36	07044-60200	Power Supply Board	Hewlett-Packard
37	5060-0767	Foot	Hewlett-Packard
38	1490-0030	Stand, Tilt	Hewlett-Packard

Figure 6-1. Main Frame – Model 7044A (Sheet 2 of 7)

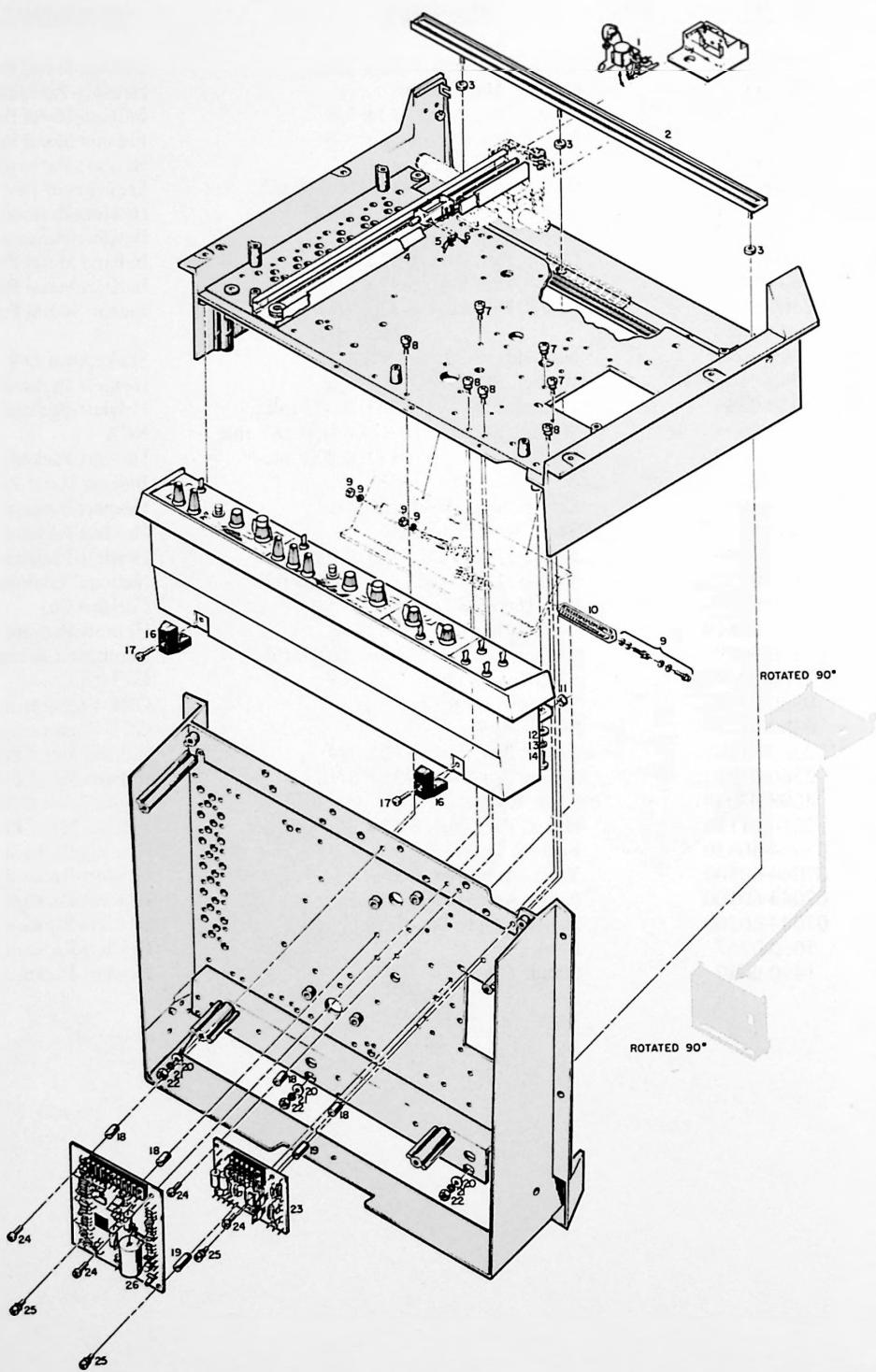
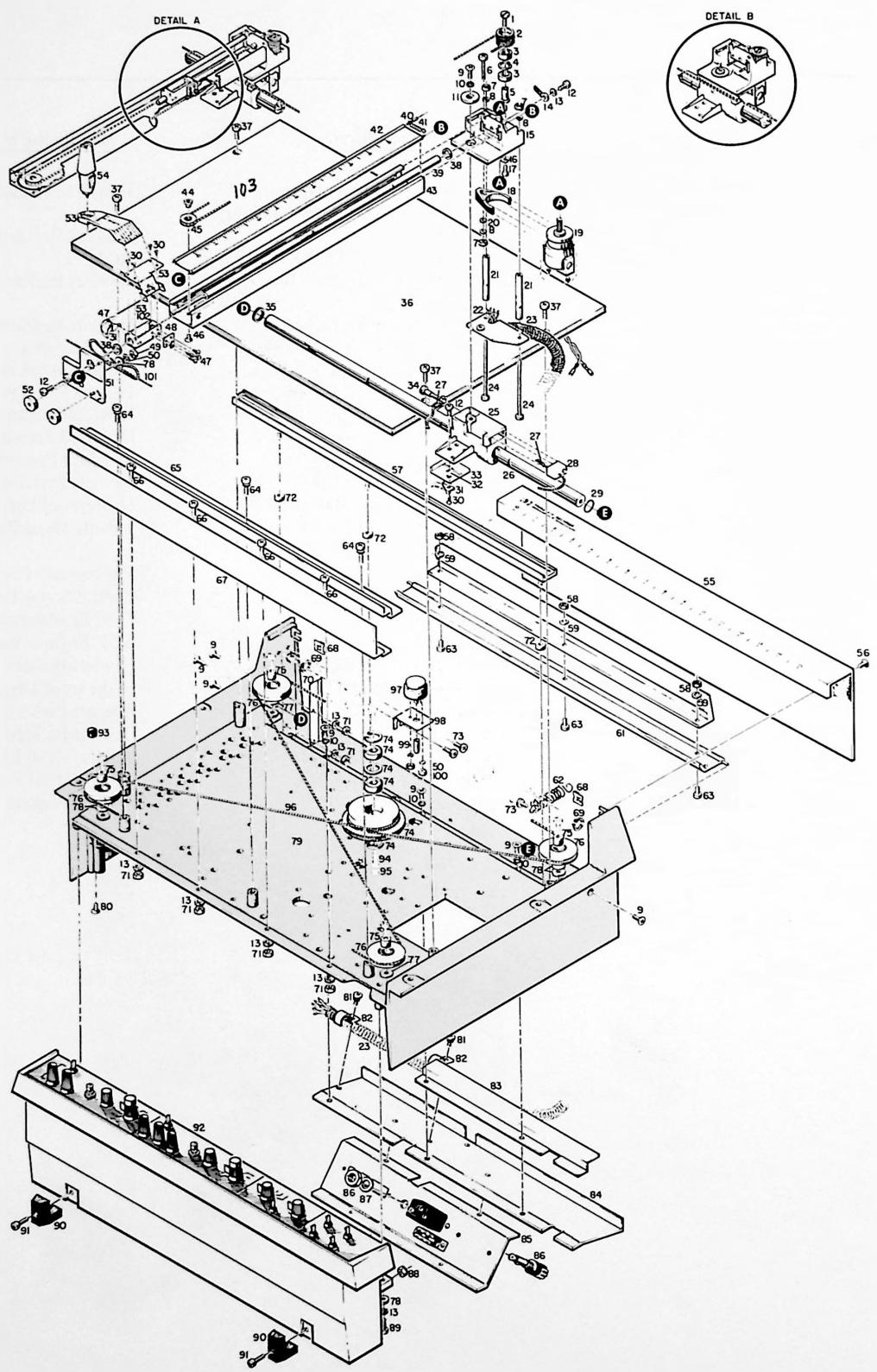


Figure 6-1. Main Frame – Model 7044A (Sheet 3 of 7)

<u>Item</u>	<u>Part No.</u>	<u>Description</u>	<u>Manufacturer</u>
1	07040-60918	Event Marker Assembly, Option 002	Hewlett-Packard
2	07040-60570	X-axis Retransmitting Potentiometer, Option 003	Hewlett-Packard
3	2190-0835	Washer, Shoulder, 0.375 OD, 0.187 thk.	RCA
4	07040-60560	Y-axis Retransmitting Potentiometer, Option 004	Hewlett-Packard
5	5080-8117	Wiper Assembly, Y-axis	Hewlett-Packard
6	0516-0004	Screw, Pan, 0-80 x 1/8	H.M. Harper Co.
7	2360-0117	Screw, Pan, Pozi, 6-32 x 3/8	Indiana Metal Prod.
8	2360-0119	Screw, Pan, Pozi, 6-32 x 7/16	Indiana Metal Prod.
9	1251-0218	Post Locking, Option 007	Hewlett-Packard
10	1251-2961	Rear Connector, Option 007	Hewlett-Packard
11	0510-0195	Locknut, 6-32	Standard Pressed Steel
12	3050-0399	Washer, Flat, 0.375 OD, 0.032 thk.	Hewlett-Packard
13	2190-0007	Washer, Lock, 0.280 OD, 0.018 thk.	Shakeproof Div. ITW
14	2360-0203	Screw, Pan, Pozi, 6-32 x 5/8	Indiana Metal Prod.
15	Not Used		
16	0403-0190	Foot, Rubber	Rubbercraft Corp.
17	2360-0085	Screw, Mach, 6-32 x 5/8	Central Screw Co.
18	0380-0111	Standoff, Rivet	GOE Engineering
19	0380-0156	Standoff, Swaged	GOE Engineering
20	3050-0399	Washer, Flat, 0.375 OD, 0.032 thk.	Hewlett-Packard
21	2190-0007	Washer, Lock, 0.280 OD, 0.018 thk.	Shakeproof Div. ITW
22	2420-0010	Nut, Hex, 6-32	Hewlett-Packard
23	07044-60300	TTL Logic Board	Hewlett-Packard
24	2360-0191	Screw, Pan, Pozi, 6-32 x 3/16	Indiana Metal Prod.
25	2360-0113	Screw, Pan, Pozi, 6-32 x 1/4	Indiana Metal Prod.
26	07044-60400	Time Base Board	Hewlett-Packard

Figure 6-1. Main Frame -- Model 7044A (Sheet 4 of 7)



<u>Item</u>	<u>Part No.</u>	<u>Description</u>	<u>Manufacturer</u>
1	0570-0125	Screw, Mach, 4-40 x 3/16	Anti-Corrosive Material Prod.
2	07040-20550	Gear, Drive, Y-axis	Hewlett-Packard
3	1410-0277	Ball Bearing	Georg Muller
4	0510-0242	Retainer, Ring	Waldes Kohinoor
5	07040-20730	Retainer	Hewlett-Packard
6	2360-0207	Screw, Pan, 6-32 x 7/8	Indiana Metal Prod.
7	2420-0016	Nut, Hex, 6-32	Hewlett-Packard
8	2190-0105	Washer, Lock, 0.239 OD, 0.025 thk.	National Lockwasher Co.
9	2360-0183	Screw, Pan, 6-32 x 3/8	Indiana Metal Prod.
10	2190-0179	Washer, Lock, 0.300 OD, 0.018 thk.	Shakeproof Div. ITW
11	07040-20600	Washer	Hewlett-Packard
12	2360-0084	Screw, Phillips, 6-32 x 1/4	Central Screw Co.
13	2190-0007	Washer, Lock, 0.280 OD, 0.018 thk.	Shakeproof Div. ITW
14	0360-0005	Soldered Lug, Terminal	Zierick Mfg. Co.
15	07040-60830	Block, Motor, Y Arm	Hewlett-Packard
16	2190-0108	Washer, Lock, 0.226 OD, 0.031 thk.	National Lockwasher Co.
17	2200-0141	Screw, Pan, Pozi, 4-40 x 5/16	Pheoll Mfg. Co.
18	07040-40040	Clamp, Servo Motor	Hewlett-Packard
19	5060-6608	Servo Motor, Y-axis	Hewlett-Packard
20	3050-0393	Washer, Flat, 0.313 OD, 0.020 thk.	Hewlett-Packard
21	07040-20950	Standoff, Cable	Hewlett-Packard
22	07040-00200	Bracket, Trail Cable	Hewlett-Packard
23	1460-1248	Spring, Extension, 16 ft.	Superior Spring Co.
24	2360-0221	Screw, Pan, Pozi, 6-32 x 2 1/2	Indiana Metal Prod.
25	07040-60670	X Slider Block	Hewlett-Packard
26	07040-20620	Slider Rod, X-axis	Hewlett-Packard
27	0362-0191	Sleeve, Cable Termination	Sevenstrand Tackle Mfg Co.
28	07040-40020	Tightener, Cable	Hewlett-Packard
29	0460-0356	O-Ring	Hewlett-Packard
30	0516-0005	Screw, Pan, 0-80 x 3/16	Pheoll Mfg. Co.
31	5080-8117	Wiper Assembly, X-axis	Hewlett-Packard
32	0510-0198	Nut, Hex, 0-80	A. Schnitzer
33	07040-60680	Block, Wiper	Hewlett-Packard
34	2360-0318	Screw, Pan, Pozi, 6-32 x 1-7/8	Stillwater Mfg. Co.
35	07040-00020	Bumper	Hewlett-Packard
36	07040-60520	Table	Hewlett-Packard
37	2360-0201	Screw, Pan, Pozi, 6-32 x 1/2	Indiana Metal Prod.
38	07040-00250	Bumper, Y-axis	Hewlett-Packard
39	07040-20560	Slider Rod, Y-axis	Hewlett-Packard
40	07040-20240	Bumper, Pen Lift	Hewlett-Packard
41	1460-1253	Spring, Y-axis Scale	Superior Spring Co.
42	07040-60916	Scale, English, Y-axis	Hewlett-Packard
43	07040-60917	Scale, Metric, Y-axis	Hewlett-Packard
44	07040-60550	Y-axis Slidewire Assembly (13.1k)	Hewlett-Packard
45	07040-20160	Stud, Pulley	Hewlett-Packard
46	07040-20540	Pulley, Idler, Y-axis	Hewlett-Packard
47	2200-0138	Screw, Pozi, 4-40 x 3/16	Pheoll Mfg. Co.
48	0516-0004	Screw, Pan, 0-80 x 1/8	H. M. Harper Co.
49	07040-00290	Bracket, Cable	Hewlett-Packard
50	2260-0001	Nut, Hex, 4-40	A. Schnitzer
51	2190-0031	Washer, Lock, 0.225, 0.015 thk.	Shakeproof Div. ITW
52	07040-40080	Cap, End	Hewlett-Packard
53	07040-20610	Wheel	Hewlett-Packard
	07040-60820	Pen Holder Assembly	Hewlett-Packard

Figure 6-1. Main Frame – Model 7044A (Sheet 6 of 7)

<u>Item</u>	<u>Part No.</u>	<u>Description</u>	<u>Manufacturer</u>
54	5081-1190	Disposable Pen, Red	Hewlett-Packard
	5081-1191	Disposable Pen, Blue	Hewlett-Packard
	5081-1192	Disposable Pen, Green	Hewlett-Packard
	5081-1193	Disposable Pen, Black	Hewlett-Packard
55	07044-60550	Rear Hood Assembly - English	Hewlett-Packard
	07044-60560	Rear Hood Assembly - Metric	Hewlett-Packard
56	2510-0107	Screw, Pan, Pozi, 8-32 x 5/8	Indiana Metal Prod.
57	07040-60570	X-axis Slidewire Assembly (19.2k)	Hewlett-Packard
58	0610-0001	Nut, Hex, 2-56	Federal Screw Prod.
59	2190-0103	Washer, Lock, 0.185 OD, 0.013 thk.	Shakeproof Div. ITW
60	07040-21010	Bar, Weight	Hewlett-Packard
61	07040-60720	Pen Lift Assembly	Hewlett-Packard
62	1460-1252	Spring, Pen Lift Assembly, X-axis	Superior Spring Co.
63	0520-0128	Screw, Pan, 2-56 x 1/4	Pheoll Mfg. Co.
64	2360-0117	Screw, Pan, Pozi, 6-32 x 3/8	Indiana Metal Prod.
65	07040-20650	Stop, Paper	Hewlett-Packard
66	2360-0199	Screw, Pan, Pozi, 6-32 x 7/16	Indiana Metal Prod.
67	07040-20670	Support, Y Arm	Hewlett-Packard
68	0590-0997	Nut, Sheet Metal	Tinnerman
69	0510-0262	Retainer, C-Ring	Waldes Kohinoor
70	07040-00210	Guide, Wire	Hewlett-Packard
71	2420-0010	Nut, Hex, 6-32	Hewlett-Packard
72	2190-0835	Washer, Shoulder, 0.375 OD, 0.187 thk.	RCA
73	0624-0206	Screw, Pan, Pozi, 6-32 x 1/4	Continental Screw Co.
74	07040-20640	Drive Gear, 240T	Hewlett-Packard
75	07040-20520	Sleeve, Idler Pulley	Hewlett-Packard
76	07040-60217	Pulley	Hewlett-Packard
77	2190-0151	Washer, Flat	Corland Co.
78	3050-0139	Washer, Flat	Harper
79	07040-60580	Casting, Main Frame	Hewlett-Packard
80	2200-0165	Screw, FH, Pozi, 4-40 x 1/4	Pheoll Mfg. Co.
81	2360-0113	Screw, Pan, Pozi, 6-32 x 1/4	Indiana Metal Prod.
82	0510-0790	Clamp, Cable	Empire Electric Co.
83	07040-00140	Guard	Hewlett-Packard
84	07040-00050	Guide, Trail Spring	Hewlett-Packard
85	07040-00060	Bracket, Power	Hewlett-Packard
86	1400-0084	Holder, Fuse, 250V, 15A max	Littlefuse
87	2190-0068	Washer, Lock, 0.630 OD, 0.022 thk.	Shakeproof Div. ITW
88	0510-0195	Locknut, 6-32	Standard Pressed Steel
89	2360-0203	Screw, Pan, Pozi, 6-32 x 5/8	Indiana Metal Prod.
90	0403-0190	Rubber, Foot	Rubbercraft Corp.
91	2360-0085	Screw, Mach, 6-32 x 5/8	Central Screw
92	07040-21050	Front Casting	Hewlett-Packard
93	07040-20760	Stop, Paper	Hewlett-Packard
94	07040-20930	Stud	Hewlett-Packard
95	3050-0766	Washer, 0.500 OD, 0.005 thk.	Miller Gasket
96	07040-60911	X-axis Cable Assembly	Hewlett-Packard
97	0491-0059	Solenoid Assembly	Hewlett-Packard
98	07040-00150	Bracket	Hewlett-Packard
99	07040-20870	Plunger End	Hewlett-Packard
100	0615-0005	Nut, Hex, 3-48	Corland Co.
101	07040-60913	Y-axis Cable Assembly	Hewlett-Packard
102	07040-20740	Block, Y Slider	Hewlett-Packard

Figure 6-1. Main Frame - Model 7044A (Sheet 7 of 7)

TABLE 6-1. PARTS LIST – MODEL 7044A

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A1	07044-60200	1	POWER SUPPLY BOARD ASSY.	28480	07044-60200
A1C1	0150-0119	2	C:FXD CER 2 X 0.01 UF 20% 250VAC	56289	36c219A2-COH
A1C2	0150-0119	1	L:FXD CER 2 X 0.01 UF 20% 250VAC	56289	36c219A2-COH
A1C3	0180-2240	2	C:FXD ELECT 2400 UF +75-10% 25VDC	28480	0180-2240
A1C5	0180-2240	1	C:FXD ELECT 2400 UF +75-10% 25VDC	28480	0180-2240
A1C6	0180-0374	2	C:FXD TANT. 10 UF 10% 20VDCW	56289	150D106X9020B2-0YS
A1CR1	1901-0191	6	DIODE:SILICON 0.75A 100PIV	04713	SR1358-2
A1CR2	1901-0191	1	DIODE:SILICON 0.75A 100PIV	04713	SR1358-2
A1CR3	1901-0191	1	DIODE:SILICON 0.75A 100PIV	04713	SR1358-2
A1CR4	1901-0191	1	DIODE:SILICON 0.75A 100PIV	04713	SR1358-2
A1CR5	1901-0470	2	DIODE:SI 1000 PIV 0.75A	28480	1901-0470
A1CR6	1901-0470	1	DIODE:SI 1000 PIV 0.75A	28480	1901-0470
A1CR7	1902-3107	1	DIODE BREAKDOWN:5.76V 2A	28480	1902-3107
A1CR9	1901-0191	1	DIODE:SILICON 0.75A 100PIV	04713	SR1358-2
A1IC1	1820-0054	2	IC:TTL QUAD 2-INPT NAND GATE	01295	SN7400N
A1K3	1854-0370	2	TSTR:SI NPN	80131	2N5294
A1K4	1854-071	11	TSTR:SI NPN(SELECTED FROM 2N3704)	28480	1854-0071
A1K5	1854-0003	1	TSTR:SI NPN(SELECTED FROM 2N1711)	28480	1854-0003
A1K1	0698-3426	1	R:FXD MET FLM 464K OHM 1% 1/2W	28480	0698-3426
A1F1	2110-0003	1	FUSE 3A	28480	2110-0003
A1K2	0690-1061	2	R:FXD COMP 10 MEGOHM 10% 1W	01121	G8 1061
A1R3	0690-1061	1	R:FXD CJMP 10 MEGOHM 10% 1W	01121	G8 1061
A1K9	0757-0280	11	R:FXD MET FLM 1K OHM 1% 1/8W	28480	0757-0280
A1K10	0811-1676	2	R:FXD WE 6.8 OHM 5% 2W	28480	0811-1676
A1R11	0811-1676	1	R:FXD WE 6.8 OHM 5% 2W	28480	0811-1676
A1R12	0698-3395	1	R:FXD MET FLM 34.8 OHM 1% 1/2W	28480	0698-3395
A1K13	0757-0814	1	R:FXD MET FLM 511 OHM 1% 1/2W	28480	0757-0814
A1K14	0757-0280	1	R:FXD MET FLM 1K OHM 1% 1/8W	28480	0757-0280
A1K15	0698-0085	2	R:FXD MET FLM 2.6K OHM 1% 1/8W	28480	0698-0085
A1K16	0698-3403	3	R:FXD MET FLM 348 OHM 1% 1/2W	28480	0698-3403
A1K17	0698-3403	1	R:FXD MET FLM 348 OHM 1% 1/2W	28480	0698-3403
A1R18	0757-0428	3	R:FXD MET FLM 1.62K OHM 1% 1/8W	28480	0757-0428
A2	07044-60500	1	Y-AXIS AMPLIFIER BOARD ASSY	28480	07044-60500
A2C1	0160-0161	3	C:FXD HY 0.01 UF 10% 200VDCW	56289	192P10392-PTS
A2C2	0160-0157	2	C:FXD HY 0.0047 UF 10% 200VDCW	56289	192P47292-PTS
A2C3	0160-2207	6	C:FXD MICA 300 PF 5%	28480	0160-2207
A2C4	0160-2207	1	C:FXD MICA 300 PF 5%	28480	0160-2207
A2C5	0160-2207	1	C:FXD MICA 300 PF 5%	28480	0160-2207
A2C6	0180-1735	1	C:FXD ELECT 0.22 UF 10% 35VDCW	56289	150D224X9035A2-DYS
A2C7	0160-2199	1	C:FXD MICA 30 PF 5% 300VDCW	28480	0160-2199
A2C8	0180-0197	4	C:FXD ELECT 2.2 UF 10% 20VDCW	56289	150D225X9020A2-DYS
A2C9	0180-0197	1	C:FXD ELECT 2.2 UF 10% 20VDCW	56289	150D225X9020A2-DYS
A2C10	0160-0165	1	C:FXD MY 0.056 UF 200 VDCW	56289	292P56392-PTS
A2C11	0180-2340	4	C:FXD AL ELECT 3600 UF +75-10% 30VDCW	56289	390368G030J14-D58
A2C12	0180-2340	1	C:FXD AL ELECT 3600 UF +75-10% 30VDCW	56289	390368G030J14-D58
A2C13	0180-0291	6	C:FXD ELECT 1.0 UF 10% 35VDCW	56289	1500105X9035A2-DYS
A2C14	0180-0291	1	C:FXD ELECT 1.0 UF 10% 35VDCW	56289	1500105X9035A2-DYS
A2C15	0683-1065	2	R:FXD COMP 10 OHM 5% 1/4W	01121	C8 1065
A2C15	0160-0819	2	C:FXD HY 0.067 UF 10% 600VDCW	14655	MMF-6547
A2C16	0160-0161	1	C:FXD HY 0.01 UF 10% 200VDCW	56289	192P10392-PTS
A2CR1	1901-0376	4	DIODE:SILICON 35V	28480	1901-0376
A2CR2	1901-0376	1	DIODE:SILICON 35V	28480	1901-0376
A2CR3	1902-0025	4	DIODE,BREAKDOWN:10.0V 5% 400 MW	28480	1902-0025
A2CR4	1902-0025	1	DIODE,BREAKDOWN:10.0V 5% 400 MW	28480	1902-0025
A2CR5	1902-0041	2	DIODE:BREAKDOWN 5.11V 5%	04713	S210939-98
A2CR6	1901-0044	4	DIODE:SILICON 20MA/1V	28480	1901-0044
A2CR7	1901-0044	1	DIODE:SILICON 20MA/1V	28480	1901-0044
A2CR8	1902-3150	2	DIODE BREAKDOWN:9.09V 2%	28480	1902-3150
A2CR9	1902-3150	1	DIODE BREAKDOWN:9.09V 2%	28480	1902-3150
A2CR10	1901-0363	2	DIODE ASSY:SI 100 PIV PER CELL	28480	1901-0363
A2CR11	1902-3208	2	DIODE BREAKDOWN:15.4V 5% 400MW	28480	1902-3208
A2CR12	1902-3208	1	DIODE BREAKDOWN:15.4V 5% 400MW	28480	1902-3208
A2CR13	1902-0777	2	DIODE:BREAKDOWN 6.2V 5%	04713	1N825
A2CR14	1902-0777	1	DIODE:BREAKDOWN 6.2V 5%	04713	1N825
A2F1	2110-0059	4	FUSE:CARTRIDGE 1-1/2A SLO-BLO	71400	MOL 1.5
A2F2	2110-0059	1	FUSE:CARTRIDGE 1-1/2A SLO-BLO	71400	MOL 1.5
A2IC1	1820-0223	9	INTEGRATED CIRCUIT:OPERATIONAL AMPL.	28480	1820-0223
A2IC2	1820-0223	1	INTEGRATED CIRCUIT:OPERATIONAL AMPL.	28480	1820-0223
A2IC3	1820-0223	1	INTEGRATED CIRCUIT:OPERATIONAL AMPL.	28480	1820-0223
A2IC4	1820-0223	1	INTEGRATED CIRCUIT:OPERATIONAL AMPL.	28480	1820-0223
A2L1	9170-0016	2	BEAD:MAGNETIC SHIELDING	02114	56-590-65/3B
A2L2	9170-0016	1	BEAD:MAGNETIC SHIELDING	02114	56-590-65/3B
A2Q1	1855-0376	2	TSTR:DUAL FET SI N-CHANNEL	28480	1855-0376
A2Q2	1854-0071	1	TSTR:SI NPN(SELECTED FROM 2N3704)	28480	1854-0071
A2Q3	1854-0071	1	TSTR:SI NPN(SELECTED FROM 2N3704)	28480	1854-0071
A2Q4	1854-0039	4	TSTR:SI NPN	80131	2N3053
A2Q5	1853-0012	2	TSTR:SI PNP	80131	2N2904A

See introduction to this section for ordering information

TABLE 6-1. PARTS LIST – MODEL 7044A (Continued)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A2U6	1854-0072	2	TSTR:SI NPN	80131	2N3054
A2U7	1853-0303	2	TSTR:SI PNP	80131	2N5956
A2U8	1854-0039	2	TSTR:SI NPN	80131	2N3053
A2U9	1853-0041	2	TSTR:SI PNP	02735	38640
A2K1	0757-0280	5	R:FXD MET FLM 1K OHM 1% 1/BW	28480	0757-0280
A2R2	0698-3152	2	R:FXD MET FLM 3.48K OHM 1% 1/BW	28480	0698-3152
A2R3	0698-7494	6	R:FXD FLM 34.8K OHM 1.0% 1/BW	28480	0698-7494
A2K4	0698-7494	2	R:FXD FLM 34.8K OHM 1.0% 1/BW	28480	0698-7494
A2R5	0757-0398	2	R:FXD MET FLM 75 OHM 1% 1/BW	28480	0757-0398
A2K6	2100-3288	3	R:VAR 50 OHM 20% 20 TURN	28480	T-05753
A2K7	0757-0444	2	R:FXD MET FLM 12.1K OHM 1% 1/BW	28480	0757-0444
A2K8	0757-0278	3	R:FXD MET FLM 1.78K OHM 1% 1/BW	28480	0757-0278
A2R9	0811-3156	2	R:FXD WH 833.33 OHM 0.05% 1/BW	28480	0811-3156
A2K10	0811-3153	2	R:FXD WH 166.67 OHM 0.05% 1/BW	28480	0811-3153
A2K11	0757-0442	7	R:FXD MET FLM 10.0K OHM 1% 1/BW	28480	0757-0442
A2K12	0757-0442	2	R:FXD MET FLM 10.0K OHM 1% 1/BW	28480	0757-0442
A2K13	0698-5846	4	R:FXD COMP 13 MEGOHM 5% 1/2W	01121	EB 1365
A2K14	0698-5846	4	R:FXD COMP 13 MEGOHM 5% 1/2W	01121	EB 1365
A2R15	0683-1065	1	R:FXD COMP 10M 5% 1/4W	01121	CB1065
A2K16	2100-2030	2	R:VAR FLM 20K OHM 10% LIN 1/2W	28480	2100-2030
A2K17	0698-6619	4	R:FXD FLM 15K OHM 0.1% 1/BW	28480	0698-6619
A2K18	0698-6619	4	R:FXD FLM 15K OHM 0.1% 1/BW	28480	0698-6619
A2K19	0757-0440	4	R:FXD MET FLM 7.50K OHM 1% 1/BW	28480	0757-0440
A2K20	0757-0439	1	R:FXD MET FLM 6.81K OHM 1% 1/BW	28480	0757-0439
A2K21	0698-7494	2	R:FXD FLM 34.8K OHM 1.0% 1/BW	28480	0698-7494
A2K22	0698-5556	2	R:FXD FLM 3.3K OHM 1% 1/BW	28480	0698-5556
A2R22	0698-7322	1	R:FXD FLM 4.25K OHM 1% 1/BW (OPTION 006)	28480	0698-7322
A2K23	2100-3296	2	R:VAR CERNET 1K OHM 20% 0.5W 20 TURN	28480	2100-3296
A2K24	0757-3280	2	R:FXD MET FLM 1K OHM 1% 1/BW	28480	0757-0280
A2K25	0757-0279	2	R:FXD MET FLM 3.16K OHM 1% 1/BW	28480	0757-0279
A2K26	0698-7646	2	R:FXD FLM 31.6K OHM 1.0% 1/BW	28480	0698-7646
A2K27	0757-0283	3	R:FXD MET FLM 2.00K OHM 1% 1/BW	28480	0757-0283
A2R28	0698-3437	4	R:FXD MET FLM 133 OHM 1% 1/BW	28480	0698-3437
A2K29	0698-3437	4	R:FXD MET FLM 133 OHM 1% 1/BW	28480	0698-3437
A2K30	0757-0440	6	R:FXD MET FLM 7.50K OHM 1% 1/BW	28480	0757-0440
A2K31	0757-0346	6	R:FXD MET FLM 10 OHM 1% 1/BW	28480	0757-0346
A2K32	0757-0346	6	R:FXD MET FLM 10 OHM 1% 1/BW	28480	0757-0346
A2K33	0757-0346	2	R:FXD MET FLM 10 OHM 1% 1/BW	28480	0757-0346
A2K34	0757-0401	2	R:FXD MET FLM 100 OHM 1% 1/BW	28480	0757-0401
A2R35	0757-0137	2	R:FXD MET FLM 750K OHM 1% 1/BW	28480	0757-0137
A2R36	0757-0416	1	R:FXD MET FLM 511 OHM 1% 1/BW	28480	0757-0416
A2K37	2100-2497	2	R:VAR FLM 2000 OHM 10% LIN 1/2W	28480	2100-2497
A2K38	0757-0394	2	R:FXD MET FLM 51.1 OHM 1% 1/BW	28480	0757-0394
A2R39	0757-0280	1	R:FXD MET FLM 1K OHM 1% 1/BW	28480	0757-0280
A2R40	0698-3266	1	R:FXD FLM 237K OHM, 1% 1/BW	19701	MFAC-T-0
A2K41	0698-4872	4	R:FXD MET FLM 649 OHM 1.0% 1/2W	28480	0698-4872
A2K42	0698-4872	4	R:FXD MET FLM 649 OHM 1.0% 1/2W	28480	0698-4872
A2R43	0757-0280	2	R:FXD MET FLM 1K OHM 1% 1/BW	28480	0757-0280
A2K44	0757-0280	2	R:FXD MET FLM 1K OHM 1% 1/BW	28480	0757-0280
A3	07044-60100	1	X-AXIS AMPLIFIER BOARD ASSY	28480	07044-60100
A3C1	0160-0161	1	C:FXD MY 0.01 UF 10% 20VDCW	56289	192P10392-PTS
A3C2	0160-0157	1	C:FXD MY 0.0047 UF 10% 20VDCW	56289	192P47292-PTS
A3C3	0160-2207	1	C:FXD MICA 300 PF 5%	28480	0160-2207
A3C4	0160-2207	1	C:FXD MICA 300 PF 5%	28480	0160-2207
A3C5	J160-2207	1	C:FXD MICA 300 PF 5%	28480	0160-2207
A3C6	0180-2205	1	C:FXD TANT 0.33 UF 10% 35VDCW	28480	150D33X9035A2-DYS
A3L7	0160-2199	1	C:FXD MICA 30 PF 5% 300VDCW	28480	0160-2199
A3C8	0180-0197	1	C:FXD ELECT 2.2 UF 10% 20VDCW	56289	150D225X9020A2-DYS
A3L9	0180-0197	1	C:FXD ELECT 2.2 UF 10% 20VDCW	56289	150D225X9020A2-DYS
A3C10	0160-0165	1	C:FXD MY 0.056 UF 200VDCW	56289	292P56392-DTS
A3C11	0180-2340	1	C:FXD AL ELECT 3600 UF +75-10% 30VDCW	56289	390368G030JT4-DSB
A3C12	0180-2340	1	C:FXD AL ELECT 3600 UF +75-10% 30VDCW	56289	390368G030JT4-DSB
A3C13	0180-0291	1	C:FXD ELECT 1.0 UF 10% 35VDCW	56289	150D105X9035A2-DYS
A3C14	0180-0291	1	C:FXD ELECT 1.0 UF 10% 35VDCW	56289	150D105X9035A2-DYS
A3C15	0160-0819	1	C:FXD MY 0.047 UF 10% 600VDCW	14655	WMP-6567
A3C16	1901-0376	1	DIODE:SILICON 35V	28480	1901-0376
A3C17	1901-0376	1	DIODE:SILICON 35V	28480	1901-0376
A3C18	1902-0025	1	DIODE,BREAKDOWN:10.0V 5% 400 MW	28480	1902-0025
A3C19	1902-0025	1	DIODE,BREAKDOWN:10.0V 5% 400 MW	28480	1902-0025
A3CR5	1902-0041	1	DIODE:BREAKDOWN 5.11V 5%	04713	SZ10939-98
A3CK6	1901-0044	1	DIODE:SILICON 20MA/IV	28480	1901-0044
A3CK7	1901-0044	1	DIODE:SILICON 20MA/IV	28480	1901-0044
A3CK8	1902-3172	2	DIODE BREAKDOWN:11.0V 2%	28480	1902-3172
A3CK9	1902-3172	2	DIODE BREAKDOWN:11.0V 2%	28480	1902-3172
A3CR10	1901-0363	2	DIODE ASSY:SI 100 PIV PER CELL	28480	1901-0363
A3CK11	1902-0679	2	DIODE BREAKDOWN:17.4V 5%	28480	1902-0679
A3CK12	1902-0679	2	DIODE BREAKDOWN:17.4V 5%	28480	1902-0679
A3CR13	1902-0786	3	DIODE=T.C. REFERENCE JEDEC TYPE	04713	IN937
A3CK14	1902-0786	3	DIODE=T.C. REFERENCE JEDEC TYPE	04713	IN937

See introduction to this section for ordering information

TABLE 6-1. PARTS LIST - MODEL 7044A (Continued)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A3F1	2110-0059		FUSE:CARTRIDGE 1-1/2A SLO-BLU	71400	MOL 1.5
A3F2	2110-0059		FUSE:CARTRIDGE 1-1/2A SLO-BLU	71400	MOL 1.5
A3IC1	1820-0223		INTEGRATED CIRCUIT:OPERATIONAL AMPL.	28480	1820-0223
A3IC2	1820-0223		INTEGRATED CIRCUIT:OPERATIONAL AMPL.	28480	1820-0223
A3IC3	1820-0223		INTEGRATED CIRCUIT:OPERATIONAL AMPL.	28480	1820-0223
A3IC4	1820-0223		INTEGRATED CIRCUIT:OPERATIONAL AMPL.	28480	1820-0223
A3L2	9170-0016		BEAD: MAGNETIC SHIELDING	02114	56-590-65/38
A3U1	1855-0376		TSTR:DUAL FET SI N-CHANNEL	28480	1855-0376
A3O2	1854-0071		TSTR:SI NPN(SELECTED FROM 2N3704)	28480	1854-0071
A3U3	1854-0071		TSTR:SI NPN(SELECTED FROM 2N3704)	28480	1854-0071
A3O4	1854-0039		TSTR:SI NPN	80131	2N3053
A3U5	1853-0012		TSTR:SI PNP	80131	2N2904A
A3U6	1854-0072		TSTR:SI NPN	80131	2N3054
A3U7	1853-0303		TSTR:SI PNP	80131	2N5956
A3U8	1854-0039		TSTR:SI NPN	80131	2N3053
A3U9	1853-0041		TSTR:SI NPN	02735	38640
A3K1	0757-0280		R:FXD MET FLM 1K OHM 1% 1/8W	28480	0757-0280
A3K2	0698-3152		R:FXD MET FLM 3.48K OHM 1% 1/8W	28480	0698-3152
A3K3	0698-7494		R:FXD FLM 34.8K OHM 1.0% 1/8W	28480	0698-7494
A3K4	0698-7494		R:FXD FLM 34.8K OHM 1.0% 1/8W	28480	0698-7494
A3K5	0757-0398		R:FXD MET FLM 75 OHM 1% 1/8W	28480	0757-0398
A3R6	2100-3288		R:VAR 50 OHM 20K 20 TURN	28480	T-05753
A3R7	0757-0444		R:FXD MET FLM 12.1K OHM 1% 1/8W	28480	0757-0444
A3R8	0757-0278		R:FXD MET FLM 1.78K OHM 1% 1/8W	28480	0757-0278
A3R9	0811-3156		R:FXD MW 833.33 OHM 0.05% 1/8W	28480	0811-3156
A3K10	0611-3153		R:FXD MW 166.67 OHM 0.05% 1/32W	28480	0811-3153
A3K11	0757-0442		R:FXD MET FLM 10.0K OHM 1% 1/8W	28480	0757-0442
A3R12	0757-0442		R:FXD MET FLM 10.0K OHM 1% 1/8W	28480	0757-0442
A3R13	0698-5846		R:FXD COMP 13 MEGOHM 5% 1/2W	01121	E8 1365
A3R14	0698-5846		R:FXD COMP 13 MEGOHM 5% 1/2W	01121	E8 1365
A3K15	0683-1065		R:FXD COMP 10M OHM 5% 1/4W	01121	CB 1065
A3R16	2100-2030	1	R:VAR 20K OHM 10% 1T	28480	2100-2030
A3K17	0698-6619		R:FXD FLM 15K OHM 0.1% 1/8W	28480	0698-6619
A3R18	0698-6619		R:FXD FLM 15K OHM 0.1% 1/8W	28480	0698-6619
A3K19	0757-0440		R:FXD MET FLM 7.50K OHM 1% 1/8W	28480	0757-0440
A3K20	0757-0442		R:FXD MET FLM 10.0K OHM 1% 1/8W	28480	0757-0442
A3K21	0698-7494		R:FXD FLM 34.8K OHM 1.0% 1/8W	28480	0698-7494
A3R22	0698-7322		R:FXD FLM 4.25K OHM 1% 1/8W (OPTION 006)	28480	0698-7322
A3K22	0698-5556		R:FXD FLM 3.3K OHM 1% 1/8W	28480	0698-5556
A3K23	2100-3215		R:VAR CERMET 1K OHM 2% 0.5% 4 TURN	28480	2100-3215
A3K24	0757-0280		R:FXD MET FLM 1K OHM 1% 1/8W	28480	0757-0280
A3K25	0757-0279		R:FXD MET FLM 3.16K OHM 1% 1/8W	28480	0757-0279
A3K26	0698-7646		R:FXD FLM 31.6K OHM 1.0% 1/8W	28480	0698-7646
A3K27	0757-0283		R:FXD MET FLM 2.00K OHM 1% 1/8W	28480	0757-0283
A3R28	0698-3437		R:FXD MET FLM 133 OHM 1% 1/8W	28480	0698-3437
A3K29	0698-3437		R:FXD MET FLM 133 OHM 1% 1/8W	28480	0698-3437
A3K30	0757-0440		R:FXD MET FLM 7.50K OHM 1% 1/8W	28480	0757-0440
A3R31	0757-0346		R:FXD MET FLM 10 OHM 1% 1/8W	28480	0757-0346
A3K32	0757-0346		R:FXD MET FLM 10 OHM 1% 1/8W	28480	0757-0346
A3R33	0757-0346		R:FXD MET FLM 10 OHM 1% 1/8W	28480	0757-0346
A3R34	0757-0401		R:FXD MET FLM 100 OHM 1% 1/8W	28480	0757-0401
A3R35	0757-0137		R:FXD MET FLM 750K OHM 1% 1/2W	28480	0757-0137
A3R36	0757-0283		R:FXD MET FLM 2.00K OHM 1% 1/8W	28480	0757-0283
A3R37	2100-2497		R:VAR FLM 2000 OHM 10% LIN 1/2W	28480	2100-2497
A3K38	0757-0394		R:FXD MET FLM 51.1 OHM 1% 1/8W	28480	0757-0394
A3R39	0757-0280		R:FXD MET FLM 1K OHM 1% 1/8W	28480	0757-0280
A3K40	0686-3260	1	R:FXD FLM 464K OHM 1% 1/8W	19701	MF4C T-0
A3K41	0698-4872		R:FXD MET FLM 649 OHM 1.0% 1/2W	28480	0698-4872
A3K42	0698-4872		R:FXD MET FLM 669 OHM 1.0% 1/2W	28480	0698-4872
A3R43	0757-0420	2	R:FXD MET FLM 750 OHM 1% 1/8W	28480	0757-0420
A3R44	0757-0420		R:FXD MET FLM 750 OHM 1% 1/8W	28480	0757-0420
A3R46	2100-2030		R:VAR FLM 20K OHM 10% LIN 1/2W	28480	2100-2030
A4	07044-60300	1	TTL BOARD ASSY	28480	07044-60300
A4			(OPTION 005)		
A4C1	0180-0291	4	C:FXD ELECT 1-0 UF 10% 35VDCW	56289	150D105X9035A2-DYS
A4CR5	1901-0025		DIODE:SILICON 100MA/1V	07263	FD 2387
A4CR6	1901-0025		DIODE:SILICON 100MA/1V	07263	FD 2387
A4CR7	1901-0025		DIODE:SILICON 100MA/1V	07263	FD 2387
A4CR8	1901-0025		DIODE:SILICON 100MA/1V	07263	FD 2387
A4IC1	1820-0328	2	IC:TTL QUAD 2-INPT NOR GATE	04713	SN7402N
A4L3	0490-0971	5	COIL:REED RELAY 12V 240 MH	71707	UF-12P
A4L4	0490-0971		COIL:REED RELAY 12V 240 MH	71707	UF-12P
A4L5	0490-0971		COIL:REED RELAY 12V 240 MH	71707	UF-12P
A4U3	1854-0071		TSTR:SI NPN(SELECTED FROM 2N3704)	28480	1854-0071
A4U4	1854-0071		TSTR:SI NPN(SELECTED FROM 2N3704)	28480	1854-0071
A4R5	0757-0280		R:FXD MET FLM 1K OHM 1% 1/8W	28480	0757-0280
A4R6	0757-0442		R:FXD MET FLM 10.0K OHM 1% 1/8W	28480	0757-0442
A4R7	0757-0280		R:FXD MET FLM 1K OHM 1% 1/8W	28480	0757-0280

See introduction to this section for ordering information

TABLE 6-1. PARTS LIST – MODEL 7044A (Continued)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A4K6	0757-0442				
A4S3	0490-077d	5	R:FXD MET FLM 10.0K OHM 1% 1/8W SWITCH:REED MAGNETIC, MINIATURE	28480	0490-077d
A4S4	0490-0778		SWITCH:REED MAGNETIC, MINIATURE	28480	0490-0778
A4S5	0490-0778		SWITCH:REED MAGNETIC, MINIATURE	28480	0490-0778
A5	07044-6040U	1	TIME BASE BOARD ASSY (INPUTUN 001)	28480	07044-60400
A5	0160-0174	1	C:FXD CER 0.67 UF +80-204 25VUCW	56289	SC1147S-CML
ASC1	0160-3477	1	C:FXD POLY 10 UF 10% 50VDCW	84411	X483W4
ASC2	0160-3477	1	C:FXD MICA 330 PF 5% 300VDCW	28480	0160-2208
ASC3	0160-2208	2	C:FXD CER 0.1 UF +80-204 50VDCW	56289	SC5081S-CML
ASC4	0160-0121	1	C:FXD ELECT 1.0 UF 10% 35VUCW	56289	15C0105X9035A2-DYS
ASC5	0160-0291	1	C:FXD ELECT 15 UF 10% 20VDCW	28480	0180-1746
ASC6	0160-1746	1	C:FXD TANT. 10 UF 10% 20VDCW	56289	1500106X902082-DYS
ASC7	0180-0374	1	C:FXD MICA 330 PF 5% 300VDCW	28480	0160-2208
ASC8	0160-2208	1	C:FXD ELECT 0.1 UF 10% 35VUCW	56289	1500104X9035A2-DYS
ASC9	0180-1743	1	C:FXD CER 1000 PF +80-204 1000VDCW	56289	C0673102E102ZS26-CDH
ASC10	0150-0054	1	C:FXD CER 0.01 UF +80-204 100VDCW	72982	B01-K800011
ASC11	0150-0093	1	C:FXD ELECT 100 UF +75-25% 12 VDCW	56289	30D107G0122002-DSM
ASC12	0150-0093	1	DIODE:T.C. REFERENCE JEDEC TYPE	04713	1N937
ASC13	0180-0039	1	DIODE:BREAKDOWN 8.25V 5%	04713	SZ10939-158
ASC14	1902-0786		DIODE:SILICON 30MA 30V	07263	F0G1088
ASC15	1902-3139	2			
ASC16	1901-0040	7			
ASC17	1901-0040		DIODE:SILICON 30MA 30V	07263	F0G1088
ASC18	1901-0040		DIODE:SILICON 30MA 30V	07263	F0G1088
ASC19	1901-0040		DIODE:SILICON 30MA 30V	07263	F0G1088
ASC20	1902-0048	1	DIODE:SILICON 30MA 30V	07263	F0G1088
ASIC1	1820-0328		DIODE:BREAKDOWN 6.81V 5%	28480	1902-0048
ASIC2	1820-0054		IC:TL QUAD 2-INPT NOR GATE	04713	SN7402N
ASIC3	1820-U223		IC:TL QUAD 2-INPT NAND GATE	01295	SN7400N
			INTEGRATED CIRCUIT:OPERATIONAL AMPL.	28480	1820-0223
ASL1	0490-0971		COIL:REED RELAY 12V 240 MH	71707	UF-12P
ASL2	0490-0971		COIL:REED RELAY 12V 240 MH	71707	UF-12P
AS01	1855-0301	1	TSTR:SI DUAL FET	80131	2N5178
AS02	1854-0071		TSTR:SI NPN(SELECTED FROM 2N3704)	28480	1854-0071
AS03	1854-0071		TSTR:SI NPN(SELECTED FROM 2N3704)	28480	1854-0071
AS04	1854-0071				
AS05	1853-0020	1	TSTR:SI NPN(SELECTED FROM 2N3702)	28480	1853-0020
ASR1	0698-3424	1	R:FXD FLM 1400 OHM 1% 1/8W	28480	0698-4424
ASR2	2100-3215		R:VAR CERMET 10 OHM 20% 0.5W 4 TURN	28480	2100-3215
ASR3	0698-3442	1	R:FXD MET FLM 237 OHM 1% 1/8W	28480	0698-3442
ASR4	0698-3158	2	R:FXD MET FLM 23.7K OHM 1% 1/8W	28480	0698-3158
ASR5	0698-3158		R:FXD MET FLM 23.7K OHM 1% 1/8W	28480	0698-3158
ASR6	0698-3150	4	R:FXD MET FLM 2.37K OHM 1% 1/8W	28480	0698-3150
ASR7	0698-3449	1	R:FXD MET FLM 28.7K OHM 1% 1/8W	28480	0698-3449
ASR8	0698-3446	1	R:FXD MET FLM 383 OHM 1% 1/8W	28480	0698-3446
ASR9	0757-0290	2	R:FXD MET FLM 6.19K OHM 1% 1/8W	28480	0757-0290
ASR10	0698-3445	1	R:FXD MET FLM 348 OHM 1% 1/8W	28480	0698-3445
ASR11	0698-3441	1	R:FXD MET FLM 215 OHM 1% 1/8W	28480	0698-3441
ASR12	0698-3150		R:FXD MET FLM 2.37K OHM 1% 1/8W	28480	0698-3150
ASR13	0698-3150		R:FXD MET FLM 2.37K OHM 1% 1/8W	28480	0698-3150
ASR14	0757-0449	1	R:FXD FLM 20K OHM 1% 1/8W	28480	0757-0449
ASR15	0757-0438	2	R:FXD MET FLM 5.11K OHM 1% 1/8W	28480	0757-0438
ASR16	0757-0280		R:FXD MET FLM 1K OHM 1% 1/8W	28480	0757-0280
ASR17	0757-0200	2	R:FXD MET FLM 5.62K OHM 1% 1/8W	28480	0757-0200
ASR18	0757-0290		R:FXD MET FLM 6.19K OHM 1% 1/8W	28480	0757-0290
ASR19	0757-0200		R:FXD MET FLM 5.62K OHM 1% 1/8W	28480	0757-0200
ASR20	0698-0082	1	R:FXD MET FLM 664 OHM 1% 1/8W	28480	0698-0082
ASR21	0757-0458	1	R:FXD MET FLM 51.1K OHM 1% 1/8W	28480	0757-0458
ASR22	0698-3150		R:FXD MET FLM 2.37K OHM 1% 1/8W	28480	0698-3150
ASR23	0757-0428		R:FXD MET FLM 1.62K OHM 1% 1/8W	28480	0757-0428
ASR24	0698-3458	1	R:FXD MET FLM 348 OHM 1% 1/8W	28480	0698-3458
ASR25	0757-0438		R:FXD MET FLM 5.11K OHM 1% 1/8W	28480	0757-0438
ASR26	2100-1986	1	R:VAR CERMET 1000 OHM 10% LIN 1/2W	28480	2100-1986
ASS1	0490-0778		SWITCH:REED MAGNETIC, MINIATURE	28480	0490-0778
ASS2	0490-0778		SWITCH:REED MAGNETIC, MINIATURE	28480	0490-0778
A1	07040-60200	1	OPTION 002-EVENT MARKER		
A1	0180-1985	1	Y-AXIS DC AMPLIFIER BOARD-STANDARD	28480	07040-60200
AIC4	1901-0191		C:FXD ELECT 500 UF +75-10% 30VDCW	56289	39D507G030FL4-DSB
AIC8	1854-0071		DIODE:SILICON 0.75A 100PIV	04713	SR1358-2
A1U1	1854-0071		TSTR:SI NPN(Selected From 2N3704)	28480	1854-0071
A1O2	1854-0370	1			
AIR4	0698-3615		TSTR:SI NPN	80131	ZN5294
AIR6	0698-3403		R:FXD MET 67 OHM 5% 2W	28480	0698-3615
AIR6	0698-3403		R:FXD MET FLM 348 OHM 1/2W	28480	0698-3403
AIR7	0698-0085		R:FXD MET FLM 2.61K OHM 1% 1/8W	28480	0698-0085
AIR8	0757-0428		R:FXD MET FLM 1.62K OHM 1% 1/8W	28480	0757-0428

See introduction to this section for ordering information

TABLE 6-1. PARTS LIST – MODEL 7044A (Continued)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
	5080-8117 07040-60570	1	X-AXIS RETRANSMITTING POTENTIOMETER (OPTION 003) WIPER ASSEMBLY SLIDEWIRE ASSEMBLY	28480 28480	5080-8117 07040-60570
	5080-8117 07040-60560	1	Y-AXIS RETRANSMITTING POTENTIOMETER (OPTION 004) Y RETRANS POT WIPER ASSEMBLY SLIDEWIRE ASSEMBLY	28480 28480	5080-8117 07040-60560
A2R22 A3R22	0698-7322 0698-7322	1 1	METRIC (OPTION 006) METRIC R:FXD FLM 4.25K OHM 1% 1/8 W R:FXD FLM 4.25K OHM 1% 1/8W	19701 19701	MF4C T-9 MF4C T-9
J1	1251-3162 1251-0218	1 2	REAR CONNECTOR (OPTION 007) REAR CONNECTOR CONNECTOR – RECEPTACLE 37 PIN FEMALE CONNECTOR POST – PANEL	28480 28480	1251-3162 1251-0218
P1	1251-3062 1251-2368 1251-1029	1 1	CONNECTOR – MATING, 37 PIN MALE CONNECTOR HOOD CONNECTOR LOCK	28480 28480 28480	1251-3062 1251-2368 1251-1029

See introduction to this section for ordering information

TABLE 6-2. MISCELLANEOUS PARTS - MODEL 7044A

HP Part No.	Description	Manufacturer	Qty.
X AND Y ATTENUATOR ASSEMBLY PART NO. 07046-60150			
0698-6353	R1 R:Fxd Flm 50k ohm 0.1% 1/8W	IRC, Inc.	1
0698-6363	R2 R:Fxd Flm 40k ohm 0.1% 1/8W	IRC, Inc.	1
0698-6320	R3 R:Fxd Flm 5k ohm 0.1% 1/8W	Dale Electronics	1
0811-3155	R4 R:Fxd Flm 4k ohm 0.05% 1/32W	Micro-Ohm Corp.	1
0757-0280	R5 R:Fxd Flm 1k ohm 1% 1/8W	IRC, Inc.	1
0698-6305	R6 R:Fxd Flm 900k ohm 0.1% 1/4W	IRC, Inc.	1
0811-3199	R7 R:Fxd Flm 90k ohm 0.05%, 1/32W	Micro-Ohm Corp.	1
0811-3154	R8 R:Fxd Flm 9k ohm 0.05% 1/32W	Micro-Ohm Corp	1
0811-3198	R9 R:Fxd Flm 1k ohm 0.05% 1/32W	Micro-Ohm Corp	1
2100-0978	R10 R:Var 5k ohm 10%	Clarostat Mfg.	1
3100-3063	S2a, b Switch, Rotary	Hewlett-Packard	1
TIME BASE SWITCH ASSEMBLY PART NO. 07046-60141			
0698-8194	R1 R:Fxd Metal Flm 10 M ohm 0.1% 1/2W	Pyrofilm Resistor	1
0698-8193	R2 R:Fxd Metal Flm 8 M ohm 0.1% 1/2W	Pyrofilm Resistor	1
0698-6369	R3 R:Fxd Flm 1M ohm 0.1% 1/4W	IRC, Inc.	1
0698-6368	R4 R:Fxd Flm 800k ohm 0.1% 1/4W	IRC, Inc.	1
0698-6358	R5 R:Fxd Flm 100k ohm 0.1% 1/8W	IRC, Inc.	1
0698-6688	R6 R:Fxd Flm 99.8k ohm 0.1% 1/8W	Electra Mfg Co.	1
3100-3062	S1 Switch, Rotary	Hewlett-Packard	1
ACCESSORY KIT - PART NO. 07040-60630 - STANDARD			
2110-0312	Fuse, 1A, 250V	Bussman Mfg. Div.	1
9211-0343	Plastic Box	Hewlett-Packard	1
5080-3635	Slidewire Lubricant	Hewlett-Packard	1
5080-3605	Slidewire Cleaner	Hewlett-Packard	1
5081-1190	Disposable Pen, Red	Hewlett-Packard	Pkg of 3
5081-1191	Disposable Pen, Blue	Hewlett-Packard	Pkg of 3
ACCESSORY KIT - PART NO. 07044-60541 - REAR CONNECTOR			
2110-0312	Fuse, 1A, 250V	Bussman Mfg. Div.	1
9211-0343	Plastic Box	Hewlett-Packard	1
5080-3635	Slidewire Lubricant	Hewlett-Packard	1
5080-3605	Slidewire Cleaner	Hewlett-Packard	1
5081-1190	Disposable Pen, Red	Hewlett-Packard	Pkg of 3
5081-1191	Disposable Pen, Blue	Hewlett-Packard	Pkg of 3
1251-1029	Lock, Rack and Panel	ITT Cannon	1
1251-2368	Hood, Rack and Panel	ITT Cannon	1
1251-3062	Connector, Rack and Panel	ITT Cannon	1
GRAPH PAPER - ENGLISH AND METRIC			
9270-1004	Chart Paper, English, Heavy	Hewlett-Packard	
9270-1005	Chart Paper, English, Light	Hewlett-Packard	
9270-1024	Chart Paper, Metric, Heavy	Hewlett-Packard	
9270-1042	Chart Paper, Metric, Light	Hewlett-Packard	

TABLE 6-2. MISCELLANEOUS PARTS – MODEL 7044A (Continued)

HP Part No.	Description	Manufacturer	Qty.
INK SUPPLIES (MAY BE ORDERED)			
5081-1191	Disposable Pen, Blue	Hewlett-Packard	Pkg of 3
5081-1192	Disposable Pen, Green	Hewlett-Packard	Pkg of 3
5081-1193	Disposable Pen, Black	Hewlett-Packard	Pkg of 3
5081-1190	Disposable Pen, Red	Hewlett-Packard	Pkg of 3
ELECTRONIC COMPONENTS/ASSEMBLIES			
07040-60570	Slidewire Assembly (19.2k) X-axis	Hewlett-Packard	1
07040-60550	Slidewire Assembly (13.1k) Y-axis	Hewlett-Packard	1
5080-8117	Slidewire Wiper Assembly	Hewlett-Packard	2
07044-60500	Y-axis Amplifier Assembly	Hewlett-Packard	1
07044-60100	X-axis Amplifier Assembly	Hewlett-Packard	1
07044-60200	Power Supply Board Assembly (Does not include option parts)	Hewlett-Packard	1
07044-60300	TTL Board Assembly	Hewlett-Packard	1
07044-60400	Time Base Board Assembly	Hewlett-Packard	1
07044-60580	Y-Axis Amplifier Assembly – Metric	Hewlett-Packard	1
07044-60590	X-Axis Amplifier Assembly – Metric	Hewlett-Packard	1
MAINFRAME COMPONENTS			
1400-0084	F1 Fuse, Holder	Littlefuse, Inc.	1
2110-0312	F1 Fuse, 1A (for 230V operation)	Littlefuse, Inc.	1
2110-0002	F1 Fuse, 2A (for 115V operation)	Littlefuse, Inc.	1
1251-2357	P1 Ac Receptacle	Switchcraft, Inc.	1
0491-0059	L1 Solenoid Assembly	Ledex	1
3101-1234	S2 Switch, DPDT	Switchcraft	1
07044-60510	T1 Power Transformer	Hewlett-Packard	1
8120-1378	J1 Power Cord	Belden Corp	1
5060-6608	X Motor Assembly	Hewlett-Packard	1
5060-6608	Y Motor Assembly	Hewlett-Packard	1
2100-2682	R11 Potentiometer, 10k, 10 turn	Beckman	1
07040-60560	Y Slidewire – Retrans	Hewlett-Packard	1
5080-8117	Wiper Assembly	Hewlett-Packard	1
07040-60570	X Slidewire – Retrans	Hewlett-Packard	1
5080-8117	Wiper Assembly	Hewlett-Packard	1
07040-60570	R12 X Slidewire	Hewlett-Packard	1
5080-8117	Wiper Assembly	Hewlett-Packard	1
07040-60550	R12 Y Slidewire	Hewlett-Packard	1
5080-8117	Wiper Assembly	Hewlett-Packard	1
07040-60921	Clamp, Shipping	Hewlett-Packard	1
4040-0879	Cover, Dust, Plastic	Hewlett-Packard	1

TABLE 6-3. ONE YEAR ISOLATED SPARE PARTS LIST – MODEL 7044A

Ref. Designation	HP Part No.	Description	Qty.
A2C8, 9 }			
A3C8, 9 }	0180-0197	Capacitor, 2.2 uF, 20V	1
A2C6	0180-1735	Capacitor, .22 uF, 35V	1
A2C13, 14 }			
A3C13, 14 }	0180-0291	Capacitor, 1 uF, 35V	1
A1C6	0180-0374	Capacitor, 10 uF, 20V	1
A3C6	0180-2205	Capacitor, .33 uF, 35V	1
A1C3,5	0180-2240	Capacitor, 2400 uF, 25V	1
A2C11,12 }	0180-2340	Capacitor, 3600 uF, 30V	1
A3C11,12 }			
A2R41,42 }	0698-4872	Resistor, 649 ohms	1
A3R41,42 }			
A2R1,24,43,44	0757-0280	Resistor, 1 k ohm	1
A1R13	0757-0814	Resistor, 511 ohms	1
A3IC1,2,3,4 }	1820-0223	Integrated Circuit, Lin. Amp	2
A2IC1,2,3,4 }			
A1IC1	1820-0054	Integrated Circuit	1
A2Q5 }			
A3Q5 }	1853-0012	Transistor	1
A2Q9 }			
A3Q9 }	1853-0041	Transistor	1
A2Q7 }			
A3Q7 }	1853-0303	Transistor	1
A1Q5	1854-0003	Transistor	1
A2Q4,8 }			
A3Q4,8 }	1854-0039	Transistor	1
A1Q4 }			
A2Q2,3 }	1854-0071	Transistor	1
A3Q2,4 }			
A2Q6 }			
A3Q6 }	1854-0072	Transistor	1
A1Q3	1854-0370	Transistor	1
A2Q1 }			
A3Q1 }	1855-0376	Transistor, Dual FET	1
A2CR6,7 }			
A3CR6,7 }	1901-0044	Diode	2
A1CR1,2,3,4,9	1901-0191	Diode	4
A2CR10 }			
A3CR10 }	1901-0363	Diode	1
A2CR1,2 }			
A3CR1,2 }	1901-0376	Diode	2
A1CR5,6	1901-0470	Diode	2
A2CR3,4 }			
A3CR3,4 }	1902-0025	Diode, 10V, Zener	2
A2CR5 }			
A3CR5 }	1902-0041	Diode, 5.11V, Zener	1
A3CR11,12	1902-0679	Diode, 17.4V, Zener	1
A2CR13,14	1902-0777	Diode, 6.2V, Zener	1
A3CR13,14	1902-0786	Diode, 9V, Zener	1
A1CR7	1902-3107	Diode, 5.76V, Zener	1
A2CR8,9	1902-3150	Diode, 9.09V, Zener	1
A3CR8,9	1902-3172	Diode, 11.0V, Zener	1
A2CR11, 12	1902-3208	Diode, 15.4V, Zener	1
A2R16 }			
A3R16 }	2100-2030	Variable Resistor, 20 k	1

TABLE 6-3. ONE YEAR ISOLATED SPARE PARTS LIST – MODEL 7044A (Continued)

Ref. Designation	HP Part No.	Description	Qty.
A2R37 {			
A3R37 {	2100-2497	Variable Resistor, 2 k	1
A2R23 {			
A3R23 {	2100-3296	Variable Resistor, 1 k	1
A1F1	2110-0003	Fuse, 3A, Norm Blow	5
A2F1,2 {			
A3F1,2 {	2110-0059	Fuse, 1.5 A, Slo Blow	10
	0510-0262	Retaining Ring	2
	1410-0215	Ball Bearing	2
	1410-0277	Ball Bearing	2
R11	2100-2682	Resistor, Variable 10-Turn	1
R1	2110-0002	Fuse, 2A	10
	3101-1604	Switch, Toggle	1
	3101-1605	Switch, Toggle	1
	3101-1702	Switch, Toggle	1
	8120-1378	Power Cord	
	5060-6608	Motor, Servo	1
	5080-8117	Wiper Assembly	2
	07040-20550	Y-Axis Gear	1
	07040-60640	X-Axis Gear	1
	07040-60550	Y-Axis Slidewire	1
	07040-60570	X-Axis Slidewire	1
	07040-60913	Y-Axis Drive Cable Assembly	1
	07040-60911	X-Axis Drive Cable Assembly	1

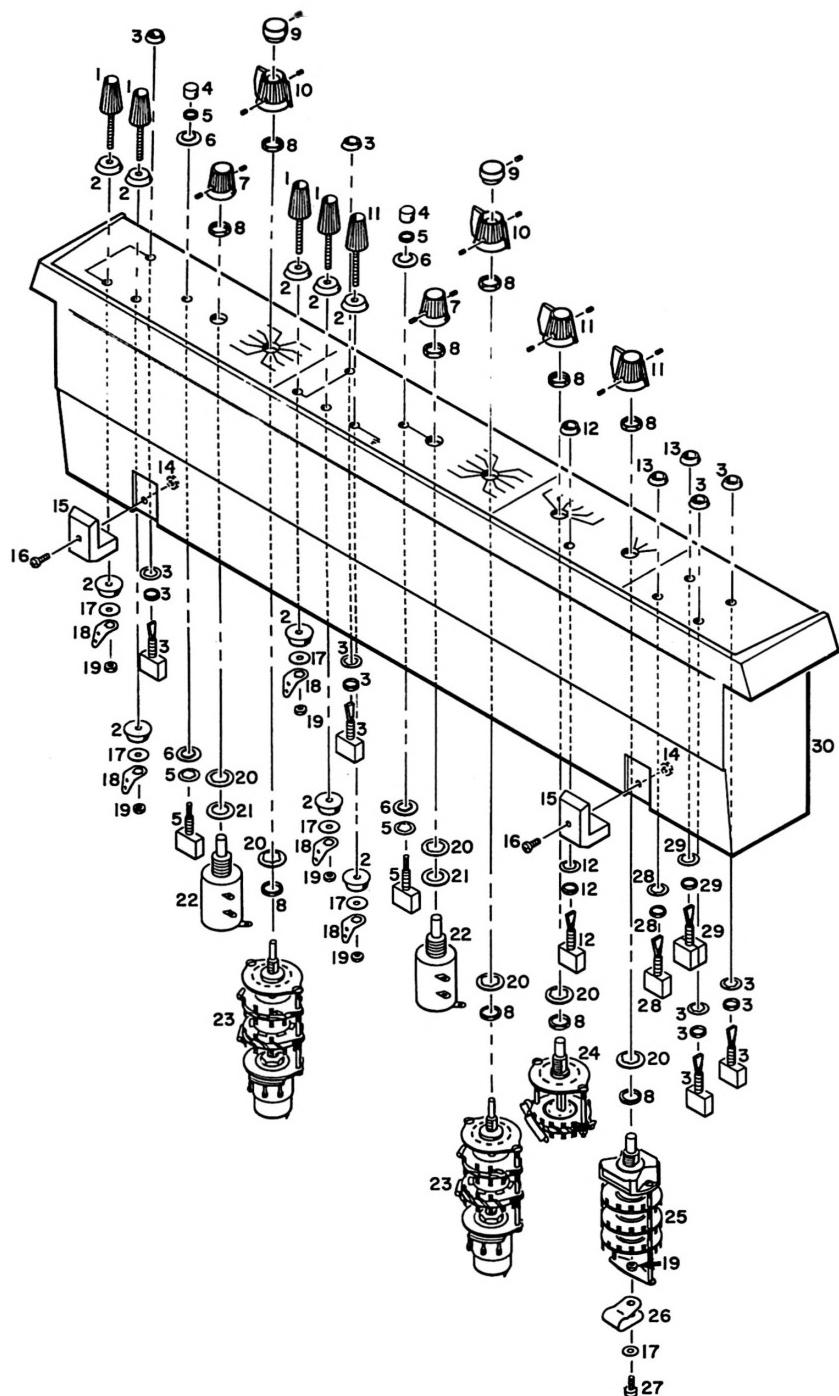


Figure 6-2. Control Panel – Model 7044A (Sheet 1 of 2)

<u>Item</u>	<u>Part No.</u>	<u>Description</u>	<u>Manufacturer</u>
1	1510-0080	Binding Post, Red	Hewlett-Packard
2	0340-0743	Insulator	Hewlett-Packard
3	3101-1702	Switch, Toggle, SPDT	C & K Components
4	3101-1671	Switch, Button, Black Plastic	C & K Components
5	3101-1261	Switch, Pushbutton, SPDT	C & K Components
6	07046-40410	Insulator, Zero Check	Hewlett-Packard
7	0370-1095	Knob, Zero	Hewlett-Packard
8	2950-0043	Nut, Hex, 3/8-32	Fischer Spec Mfg Co.
9	0370-2192	Knob, Vernier	Hewlett-Packard
10	0370-1881	Knob, Range	Hewlett-Packard
11	0370-1880	Knob, Time Base	Hewlett-Packard
12	3101-1701	Switch, Toggle, SPDT	C & K Components
13	0590-0985	Nut, 1/4-40	C & K Components
14	0510-0195	Locknut, 6-32	Standard Pressed Steel
15	0403-0190	Rubber Foot	Rubbercraft Corp.
16	2360-0085	Screw, Mach, 6-32 x 5/8	Control Screw Co.
17	3050-0399	Washer, Flat, 0.375 OD, 0.032 THK	Hewlett-Packard
18	0360-0365	Terminal, Solder Lug	Shakeproof Div, ITW
19	2420-0010	Nut, Hex, 6-32	Hewlett-Packard
20	2190-0163	Washer, Lock, 0.380 ID	Shakeproof Div, ITW
21	2190-0189	Washer, Flat, 0.375 ID	Shakeproof Div, ITW
22	2100-2682	Potentiometer, 10k, 10T	Beckman
23	07046-60150	Attenuator Assembly	Hewlett-Packard
24	07046-60141	Sweep Rate Assembly	Hewlett-Packard
25	3101-3083	Time Base X Y Off Assembly	Hewlett-Packard
26	0510-0788	Clamp, Plastic Cable	Empire
27	2360-0117	Screw, Mach, Pan, Pozi, 6-32 x 3/8	Indiana Metal Prod Co.
28	3101-1604	Switch, Toggle, DPDT	C & K Components
29	3101-1605	Switch, Toggle, SPDT	C & K Components
30	07040-21050	Panel, Front	Hewlett-Packard
31	1510-0081	Binding Post, Black	Hewlett-Packard

Figure 6-2. Control Panel – Model 7044A (Sheet 2 of 2)

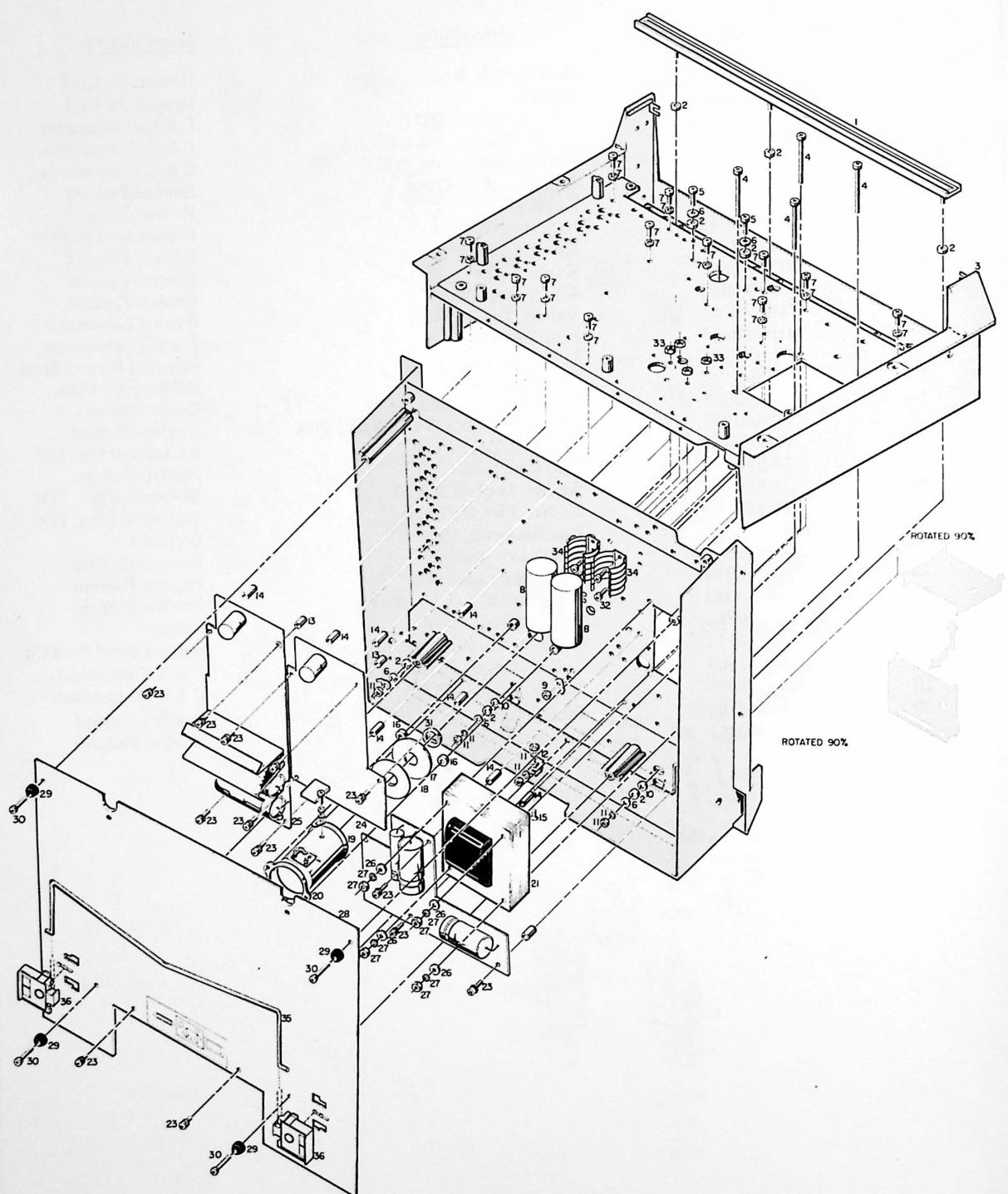


Figure 6-3. Main Frame - Model 7045A (Sheet 1 of 7)

<u>Item</u>	<u>Part No.</u>	<u>Description</u>	<u>Manufacturer</u>
1	07040-60570	X-Axis Slidewire Assembly (19.2 k)	Hewlett-Packard
2	2190-0835	Washer, Shoulder, 0.375 OD, 0.187 thk	RCA
3	07040-60580	Casting, Main Frame	Hewlett-Packard
4	2150-0067	Screw, Pan, Pozi, 8-32 x 2 in.	Indiana Metal Prod.
5	2360-0203	Screw, Pan, Pozi, 6-32 x 5/8	Indiana Metal Prod.
6	3050-0399	Washer, Flat, 0.375 OD, 0.032 thk	Hewlett-Packard
7	2360-0121	Screw, Pan, Pozi, 6-32 x 1/2	Indiana Metal Prod.
8	0180-2495	Capacitor, Fxd Alum 8700 uF -10 +75%, 40 wVdc	Sprague Electric
9	2420-0010	Nut, Hex, 6-32	Hewlett-Packard
10	3050-0392	Washer, Flat, 0.438 OD, 0.020 thk	Hewlett-Packard
11	0590-0381	Nut, Lock, 6-32	Shakeproof Div, ITW
12	07040-00240	Bracket, Support	Hewlett-Packard
13	0380-0310	Standoff, Threaded	GOE
14	0380-0771	Standoff, Swaged	Amaton Electric
15	2360-0183	Screw, Pan, 6-32 x 3/8	Indiana Metal Prod.
16	07143-20430	Washer, Flat	Hewlett-Packard
17	3050-0774	Washer, Flat, 2.125 OD, 0.005 thk	Miller Gasket Co.
18	3050-0775	Washer, Flat, 2.125 OD, 0.031 thk	Miller Gasket Co.
19	5060-6627	Servo Motor, X-Axis	Hewlett-Packard
20	1600-0252	Clamp, X-Axis Servo Motor	Hewlett-Packard
21	07045-60140	Transformer, Power	Hewlett-Packard
22	07044-60200	Power Supply Board	Hewlett-Packard
23	2360-0113	Screw, Pan, Pozi, 6-32 x 1/4	Indiana Metal Prod.
	07045-60080	X-Axis Amplifier Board	Hewlett-Packard
24	Not Used		
	07045-60090	Y-Axis Amplifier Board	Hewlett-Packard
25	Not Used		
26	3050-0139	Washer, Flat, 0.0375 OD, 0.131 thk	Harper
27	2580-0006	Nut, Hex, 8-32	Shakeproof Div, ITW
28	07045-60130	Bottom Cover, Marked	Hewlett-Packard
29	4003-0303	Foot, Rubber	Rubbercraft Corp.
30	2360-0201	Screw, Pan, Pozi, 6-32 x 1/4	Indiana Metal Prod.
31	07046-20610	Bushing, X-Axis Servo Motor	Hewlett-Packard
32	2360-0197	Screw, 6-32 x 0.37	Hewlett-Packard
33	0590-0381	Nut, 6-32	Hewlett-Packard
34	1400-0867	Clip, Cap	Hewlett-Packard
35	1490-0030	Stand, Tilt	Hewlett-Packard
36	5060-0767	Foot	Hewlett-Packard

Figure 6-3. Main Frame - Model 7045A (Sheet 2 of 7)

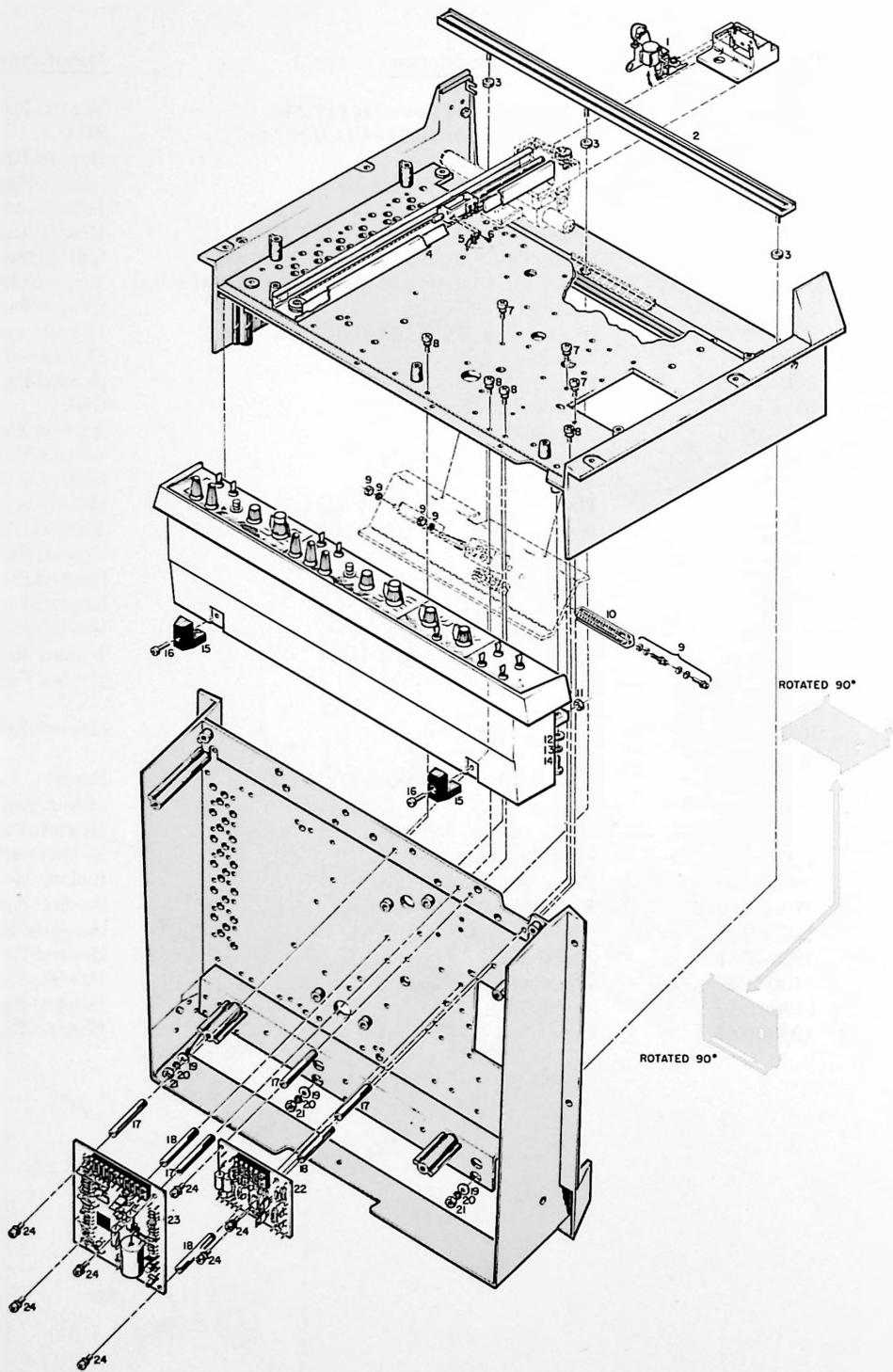


Figure 6-3. Main Frame - Model 7045A (Sheet 3 of 7)

<u>Item</u>	<u>Part No.</u>	<u>Description</u>	<u>Manufacturer</u>
1	07040-60918	Event Marker Assembly, Option 002	Hewlett-Packard
2	07040-60570	X-Axis Retransmitting Potentiometer, Opt. 003	Hewlett-Packard
3	2190-0835	Washer, Shoulder, 0.375 OD, 0.187 thk	RCA
4	07040-60560	Y-Axis Retransmitting Potentiometer, Opt. 004	Hewlett-Packard
5	5080-8117	Wiper Assembly, Y-Axis	Hewlett-Packard
6	0516-0004	Screw, Pan, 0-80 x 1/8	H. M. Harper Co.
7	2360-0117	Screw, Pan, Pozi, 6-32 x 3/8	Indiana Metal Prod.
8	2360-0119	Screw, Pan, Pozi, 6-32 x 7/16	Indiana Metal Prod.
9	1251-0218	Post Locking, Option 040	Hewlett-Packard
10	1251-2961	Rear Connector, Option 040	Hewlett-Packard
11	0510-0195	Locknut, 6-32	Standard Pressed Steel
12	3050-0399	Washer, Flat, 0.375 OD, 0.032 thk	Hewlett-Packard
13	2190-0007	Washer, Lock, 0.280 OD, 0.018 thk	Shakeproof Div. ITW
14	2360-0203	Screw, Pan, Pozi, 6-32 x 5/8	Indiana Metal Prod.
15	0403-0190	Foot, Rubber	Rubbercraft Corp.
16	2360-0085	Screw, Mach, 6-32 x 5/8	Control Screw Co.
17	0380-1023	Standoff	Hewlett-Packard
18	0380-0789	Standoff	Amatom Electric
19	3050-0399	Washer, Flat, 0.375 OD, 0.032 thk	Hewlett-Packard
20	2190-0007	Washer, Lock, 0.280 OD, 0.018 thk	Shakeproof, Div. ITW
21	2420-0010	Nut, Hex, 6-32	Hewlett-Packard
22	07045-60070	TTL Board, Option 039	Hewlett-Packard
23	07045-60] 20	Time Base Board (W/O R9, R11)	Hewlett-Packard
24	2360-0113	Screw, Pan, Pozi, 6-32 x 1/4	Indiana Metal Prod.

Figure 6-3. Main Frame - Model 7045A (Sheet 4 of 7)

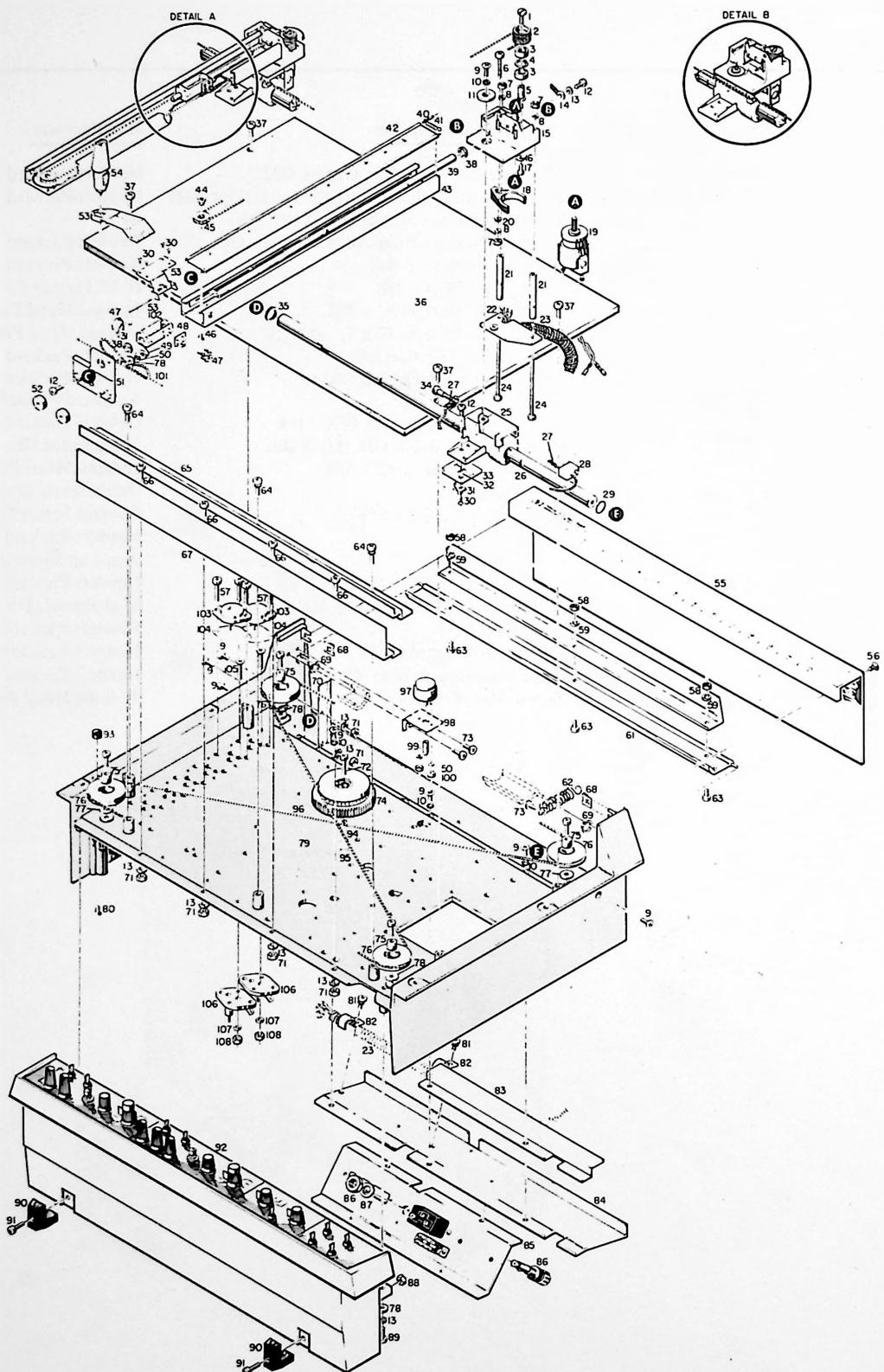


Figure 6-3. Main Frame - Model 7045A (Sheet 5 of 7)

<u>Item</u>	<u>Part No.</u>	<u>Description</u>	<u>Manufacturer</u>
1	0570-0125	Screw, Mach, 4-40 x 3/16	Anti-Corrosive Material Prod
2	07040-20550	Gear, Drive, Y-Axis	Hewlett-Packard
3	1410-0277	Ball Bearing	Georg Muller
4	0510-0242	Retainer, Ring	Waldes Kohinoor
5	07040-20730	Retainer	Hewlett-Packard
6	2360-0207	Screw, Pan, 6-32 x 7/8	Indiana Metal Prod.
7	2420-0016	Nut, Hex, 6-32	Hewlett-Packard
8	2190-0105	Washer, Loc, 0.239 OD, 0.025 thk	National Lockwasher Co.
9	2360-0183	Screw, Pan, 6-32 x 3/8	Indiana Metal Prod.
10	2190-0179	Washer, Lock, 0.300 OD, 0.018 thk	Shakeproof Div. ITW
11	07040-20600	Washer	Hewlett-Packard
12	2360-0084	Screw, Phillips, 6-32 x 1/4	Central Screw Co.
13	2190-0007	Washer, Lock 0.280 OD, 0.018 thk	Shakeproof Div. ITW
14	0360-0005	Soldered Lug, Terminal	Zierick Mfg. Co.
15	07040-60830	Block, Motor, Y Arm	Hewlett-Packard
16	2190-0108	Washer, Lock, 0.226 OD, 0.031 thk	National Lockwasher Co.
17	2200-0141	Screw, Pan, Pozi, 4-40 x 5/16	Pheoll Mfg. Co.
18	07040-40040	Clamp, Servo Motor	Hewlett-Packard
19	5060-6608	Servo Motor, Y-Axis	Hewlett-Packard
20	3050-0393	Washer, Flat, 0.313 OD, 0.020 thk	Hewlett-Packard
21	07040-20950	Standoff, Cable	Hewlett-Packard
22	07040-00200	Bracket, Trail Cable	Hewlett-Packard
23	1460-1248	Spring, Extension, 16 ft.	Superior Spring Co.
24	2360-0221	Screw, Pan, Pozi, 6-32 x 2-1/2	Indiana Metal Prod.
25	07040-60670	X Slider Block	Hewlett-Packard
26	07040-20620	Slider Rod, X-Axis	Hewlett-Packard
27	0362-0191	Sleeve, Cable Termination	Sevenstrand Tackle Mfg. Co.
28	07040-40020	Tightener, Cable	Hewlett-Packard
29	0460-0356	O-Ring	Hewlett-Packard
30	0516-0005	Screw, Pan, 0-80 x 3/16	Pheoll Mfg. Co.
31	5080-8117	Wiper Assembly, X-Axis	Hewlett-Packard
32	0510-0198	Nut, Hex, 0-80	A. Schnitzer
33	07040-60680	Block, Wiper	Hewlett-Packard
34	2360-0318	Screw, Pan, Pozi, 6-32 x 1-7/8	Stillwater Mfg. Co.
35	07040-00020	Bumper	Hewlett-Packard
36	07040-60520	Table	Hewlett-Packard
37	2360-0201	Screw, Pan Pozi, 6-32 x 1/2	Indiana Metal Prod.
38	07040-00250	Bumper, Y-Axis	Hewlett-Packard
39	07040-20560	Slider Rod, Y-Axis	Hewlett-Packard
40	0890-0349	Tubing, Plastic, Flexible	Alpha Wire Corp.
41	1460-1253	Spring, Y-Axis Scale	Superior Spring Co.
42	07040-60916	Scale, English, Y-Axis	Hewlett-Packard
43	07040-60917	Scale, Metric, Y-Axis	Hewlett-Packard
44	07040-60550	Y-Axis Slidewire Assembly (13.1 k)	Hewlett-Packard
45	07040-20160	Stud, Pulley	Hewlett-Packard
46	07040-20540	Pulley, Idler, Y-Axis	Hewlett-Packard
47	2200-0138	Screw, Pozi, 4-40 x 3/16	Pheoll Mfg. Co.
48	0516-0004	Screw, Pan, 0-80 x 1/8	H. M. Harper Co.
49	07040-00290	Bracket, Cable	Hewlett-Packard
50	2260-0001	Nut, Hex, 4-40	A. Schnitzer
51	2190-0004	Washer, Lock, 0.270, 0.015 thk	Thompson-Bremer & Co.
52	07040-40080	Cap, End	Hewlett-Packard
53	07040-20610	Wheel	Hewlett-Packard
53	07040-60820	Pen Holder Assembly	Hewlett-Packard

Figure 6-3. Main Frame - Model 7045A (Sheet 6 of 7)

<u>Item</u>	<u>Part No.</u>	<u>Description</u>	<u>Manufacturer</u>
54	5081-1190	Disposable Pen, Red	Hewlett-Packard
	5081-1191	Disposable Pen, Blue	Hewlett-Packard
	5081-1192	Disposable Pen, Green	Hewlett-Packard
	5081-1193	Disposable Pen, Black	Hewlett-Packard
55	07045-60050	Rear Hood Assembly – English	Hewlett-Packard
	07045-60060	Rear Hood Assembly – Metric	Hewlett-Packard
56	2510-0107	Screw, Pan, Pozi, 8-32 x 5/8	Indiana Metal Prod.
57	2360-0203	Screw, Pan, Pozi, 6-32 x 5/8	Indiana Metal Prod.
58	0610-0001	Nut, Hex, 2-56	Federal Screw Prod.
59	2190-0103	Washer, Lock, 0.185 OD, 0.013 thk	Shakeproof Div. ITW
60	07040-21010	Bar, Weight	Hewlett-Packard
61	07040-60720	Pen Lift Assembly	Hewlett-Packard
62	1460-1252	Spring, Pen Lift Assembly, X-Axis	Superior Spring Co.
63	0520-0128	Screw, Pan, 2-56 x 1/4	Pheoll Mfg. Co.
64	2360-0117	Screw, Pan, Pozi, 6-32 x 3/8	Indiana Metal Prod.
65	07040-20650	Stop, Paper	Hewlett-Packard
66	2360-0199	Screw, Pan, Pozi, 6-32 x 7/16	Indiana Metal Prod.
67	07040-20670	Support, Y Arm	Hewlett-Packard
68	0590-0997	Nut, Sheet Metal	Tinnerman
69	0510-0262	Retainer, C-Ring	Waldes Kohinoor
70	07040-00210	Guide, Wire	Hewlett-Packard
71	2420-0010	Nut, Hex, 6-32	Hewlett-Packard
72	2360-0229	Screw, Pan, Pozi, 6-32 x 1/2	Indiana Metal Prod.
73	0624-0206	Screw, Pan, Pozi, 6-32 x 1/4	Continental Screw Co.
74	07040-20640	Drive Gear, 240T	Hewlett-Packard
75	07040-20520	Sleeve, Idler Pulley	Hewlett-Packard
76	07040-60840	Pulley	Hewlett-Packard
77	2190-0150	Washer, Flat	Corland Co.
78	3050-0139	Washer, Flat	Harper
79	07040-60580	Casting, Main Frame	Hewlett-Packard
80	2200-0165	Screw, FH, Pozi, 4-40 x 1/4	Pheoll Mfg. Co.
81	2360-0113	Screw, Pan, Pozi, 6-32 x 1/4	Indiana Metal Prod.
82	0510-0790	Clamp, Cable	Empire Electric Co.
83	07040-00140	Guard	Hewlett-Packard
84	07040-00050	Guide, Trial Spring	Hewlett-Packard
85	07040-00060	Bracket, Power	Hewlett-Packard
86	1400-0084	Holder, Fuse, 250 V, 15 A max	Littlefuse
87	2190-0068	Washer, Lock, 0.630 OD, 0.022 thk	Shakeproof Div. ITW
88	0510-1152	Retainer, Push On	Industrial Retaining Ring
89	2360-0203	Screw, Pan, Pozi, 6-32 x 5/8	Indiana Metal Prod.
90	0403-0190	Rubber, Foot	Rubbercraft Corp.
91	07040-20970	Stud, Foot	Hewlett-Packard
92	07040-21050	Front Casting	Hewlett-Packard
93	07040-20760	Stop, Paper	Hewlett-Packard
94	07040-20930	Stud	Hewlett-Packard
95	3050-0766	Washer, 0.500 OD, 0.005 thk	Miller Gasket
96	07040-60914	X-Axis Cable Assembly	Hewlett-Packard
97	0491-0059	Solenoid Assembly	Hewlett-Packard
98	07040-00150	Bracket	Hewlett-Packard
99	07040-20870	Plunger End	Hewlett-Packard
100	0615-0005	Nut, Hex, 3-48	Corland Co.
101	07040-60913	Y-Axis Cable Assembly	Hewlett-Packard
102	07040-20740	Block, Y Slider	Hewlett-Packard
103	1853-0252	Transistor, Silicon, PNP	Motorola
	1854-0063	Transistor, Silicon, NPN	RCA
104	0340-0774	Insulator, Transistor	Miller Gasket
105	2200-0170	Screw, Mach, Pozi, 4-40 x 5/8	Pheoll Mfg. Co.
106	1200-0461	Socket, Transistor	Augat
107	2190-0108	Washer, Lock, 0.226 OD, 0.031 thk.	National Lockwasher Co.
108	2260-0001	Nut, Hex, 4-40	A. Schnitzer

Figure 6-3. Main Frame – 7045A (Sheet 7 of 7)

TABLE 6-4. PARTS LIST – MODEL 7045A

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A1	07044-60200	1	POWER SUPPLY BOARD ASSY	28480	07044-60200
A1C1	0150-0119	2	C:FXD CER 2 X 0.01 UF 20% 250VAC	56289	36C219A2-COH
A1C2	0150-0119		C:FXD CER 2 X 0.01 UF 20% 250VAC	56289	36C219A2-COH
A1C3	0180-2240	2	C:FXD ELECT 2400 UF +75-10% 25VDCW	28480	0180-2240
A1C5	0180-2240		C:FXD ELECT 2400 UF +75-10% 25VDCW	28480	0180-2240
A1C6	0180-0374	2	C:FXD TANT. 10 UF 10% 20VDCW	56289	1500106X902082-DYS
A1C81	1901-0191	2	DIODE:SILICON 0-75A 100PIV	04713	SR1358-2
A1C82	1901-0191		DIODE:SILICON 0-75A 100PIV	04713	SR1358-2
A1C83	1901-0191		DIODE:SILICON 0-75A 100PIV	04713	SR1358-2
A1C84	1901-0191		DIODE:SILICON 0-75A 100PIV	04713	SR1358-2
A1C85	1901-0470	2	DIODE:SI 1000 PIV 0.75A	28480	1901-0470
A1C86	1901-0470		DIODE:SI 1000 PIV 0.75A	28480	1901-0470
A1C87	1902-3107	1	DIODE BREAKDOWN:5.76V 2%	28480	1902-3107
A1C89	1901-0191		DIODE:SILICON 0.75A 100PIV	04713	SR1358-2
A1O3	1854-0370	2	TSTR:SI NPN	80131	2N5294
A1F1	2110-0003	1	FUSE:3A	28480	2110-0003
A1O4	1854-0071	13	TSTR:SI NPN(SELECTED FROM 2N3704)	28480	1854-0071
A1O5	1854-0003	1	TSTR:SI NPN(SELECTED FROM 2N1711)	28480	1854-0003
A1R1	0698-3426	1	R:FXD MET FLM 664K OHM 1% 1/2W	28480	0698-3426
A1R2	0690-1061	2	R:FXD COMP 10 MEGOHM 10% 1W	01121	GB 1061
A1R3	0690-1061		R:FXD COMP 10 MEGOHM 10% 1W	01121	GB 1061
A1R9	0757-0280	14	R:FXD MET FLM 1K OHM 1% 1/8W	28480	0757-0280
A1R10	0811-1676	2	R:FXD WW 6.8 OHM 5% 2W	28480	0811-1676
A1R11	0811-1676		R:FXD WW 6.8 OHM 5% 2W	28480	0811-1676
A1R12	0698-3395	1	R:FXD MET FLM 34.0 OHM 1% 1/2W	28480	0698-3395
A1R13	0757-0814	1	R:FXD MET FLM 511 OHM 1% 1/2W	28480	0757-0814
A1R14	0757-0280		R:FXD MET FLM 1K OHM 1% 1/8W	28480	0757-0280
A1R15	0698-0085	2	R:FXD MET FLM 2.61K OHM 1% 1/8W	28480	0698-0085
A1K16	0698-3403	3	R:FXD MET FLM 348 OHM 1% 1/2W	28480	0698-3403
A1K17	0698-3403		R:FXD MET FLM 348 OHM 1% 1/2W	28480	0698-3403
A1K18	0757-0428	4	R:FXD MET FLM 1.62K OHM 1% 1/8W	28480	0757-0428
A1TC1	1820-0054	2	IC:TTL QUAD 2-INPT NAND GATE	01295	SN7400N
A2	07045-60090	1	Y-AXIS AMPLIFIER BOARD ASSY	28480	07045-60090
A2C1	0160-0161	2	C:FXD MY 0.01 UF 10% 200VDCW	56289	192P10392-PTS
A2C2	0160-0157	2	C:FXD MY 0.0047 UF 10% 200VDCW	56289	192P47292-PTS
A2C3	0160-2207	6	C:FXD MICA 300 PF 5%	28480	0160-2207
A2C4	0160-0168	1	C:FXD MY 0.1 UF 10% 200VDCW	56289	192P10492-PTS
A2C5	0160-2308	1	C:FXD MICA 36 PF 5%	28480	0160-2308
A2C6	0160-2207		C:FXD MICA 300 PF 5%	28480	0160-2207
A2C7	0160-2207		C:FXD MICA 300 PF 5%	28480	0160-2207
A2C8	0160-2117	1	C:FXD MY 0.12 UF 10% 200VDCW	28480	0160-2117
A2C9	0160-2199	3	C:FXD MICA 30 PF 5% 300VDCW	28480	0160-2199
A2C10	0160-2199		C:FXD MICA 30 PF 5% 300VDCW	28480	0160-2199
A2C11	0160-2199		C:FXD MICA 30 PF 5% 300VDCW	28480	0160-2199
A2C12	0150-0081	1	C:FXD CER 0.01 UF +80-20% 500VUCW	72982	B11-000-Y5U0 103Z
A2C13	0180-0197	4	C:FXD ELECT 2.2 UF 10% 20VDCW	56289	1500225X9020A2-DYS
A2C14	0180-0197		C:FXD ELECT 2.2 UF 10% 20VDCW	56289	1500225X9020A2-DYS
A2C15	0160-0819	2	C:FXD MY 0.047 UF 10% 60VDCW	14655	WF-6547
A2C16	0180-2496	2	C:FXD AL ELECT 3200 UF +75-10% 40VDCW	56289	390328G040J14-DS8
A2C17	0180-2496		C:FXD AL ELECT 3200 UF +75-10% 40VDCW	56289	390328G040J14-DS8
A2C18	0180-0291	6	C:FXD ELECT 1.0 UF 10% 35VDCW	56289	1500105X9035A2-DYS
A2C19	0180-0291		C:FXD ELECT 1.0 UF 10% 35VDCW	56289	1500105X9035A2-DYS
A2CR1	1901-0376	4	DIODE:SILICON 35V	28480	1901-0376
A2CR2	1901-0376		DIODE:SILICON 35V	28480	1901-0376
A2CR3	1902-0041	2	DIODE:BREAKDOWN 5.11V 5%	04713	S110939-98
A2CR4	1902-0025	4	DIODE:BREAKDOWN:10.0V 5% 400 MW	28480	1902-0025
A2CR5	1902-0025		DIODE:BREAKDOWN:10.0V 5% 400 MW	28480	1902-0025
A2CR6	1901-0044	4	DIODE:SILICON 20MA/1V	28480	1901-0044
A2CR7	1901-0044		DIODE:SILICON 20MA/1V	28480	1901-0044
A2CR8	1902-3094	2	DIODE:BREAKDOWN:5.11V 2%	28480	1902-3094
A2CR9	1902-3172	2	DIODE:BREAKDOWN:11.0V 2%	28480	1902-3172
A2CR10	1902-3094		DIODE:BREAKDOWN:-11.0V 2%	28480	1902-3094
A2CR11	1902-3172		DIODE:BREAKDOWN:11.0V 2%	28480	1902-3172
A2CR12	1901-0025	12	DIODE:SILICON 100MA/1V	07263	FD 2387
A2CR13	1901-0025		DIODE:SILICON 100MA/1V	07263	FD 2387
A2CR14	1901-0025		DIODE:SILICON 100MA/1V	07263	FD 2387
A2CR15	1901-0025		DIODE:SILICON 100MA/1V	07263	FD 2387
A2CR16	1901-0363	1	DIODE ASSY:SI 100 PIV PER CELL	28480	1901-0363
A2CR17	1902-0679	2	DIODE:BREAKDOWN:17.4V 5%	28480	1902-0679
A2CR18	1902-0679		DIODE:BREAKDOWN:17.4V 5%	28480	1902-0679
A2CR19	1902-0777	2	DIODE:BREAKDOWN:6.2V 5%	04713	1N825
A2CR20	1902-0777		DIODE:BREAKDOWN 6.2V 5%	04713	1N825
A2F1	2110-0059	2	FUSE:CARTRIDGE 1-1/2A SLO-BLO	71400	MOL 1.5
A2F2	2110-0059		FUSE:CARTRIDGE 1-1/2A SLO-BLO	71400	MOL 1.5
A2IC1	1820-0223	12	INTEGRATED CIRCUIT:OPERATIONAL AMPL.	28480	1820-0223
A2IC2	1820-0223		INTEGRATED CIRCUIT:OPERATIONAL AMPL.	28480	1820-0223

See introduction to this section for ordering information

TABLE 6-4. PARTS LIST – MODEL 7045A (Continued)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A21C3	1620-0223		INTEGRATED CIRCUIT:OPERATIONAL AMPL.	28480	1620-0223
A21C4	1620-0223		INTEGRATED CIRCUIT:OPERATIONAL AMPL.	28480	1620-0223
A21C5	1620-0223		INTEGRATED CIRCUIT:OPERATIONAL AMPL.	28480	1620-0223
A21Co	1620-0223		INTEGRATED CIRCUIT:OPERATIONAL AMPL.	28480	1620-0223
A21C7	1620-0223		INTEGRATED CIRCUIT:OPERATIONAL AMPL.	28480	1620-0223
A2L1	9170-0016		BEAD: MAGNETIC SHIELDING	02114	56-590-65/3B
A2L2	9170-0016		BEAD: MAGNETIC SHIELDING	02114	56-590-65/3B
A2U1	1855-0376	2	TSTR:DUAL FET SI N-CHANNEL	28480	1855-0376
A2u2	1854-0071		TSTR:SI NPN (SELECTED FROM 2N3704)	28480	1854-0071
A2u3	1854-0071		TSTR:SI NPN (SELECTED FROM 2N3704)	28480	1854-0071
A2J4	1853-036	1	TSTR:SI PNP	80131	2N3906
A2O5	1854-0087	2	TSTR:SI NPN	80131	2N3417
A2O6	1854-0090	2	TSTR:SI NPN (SIMILAR TO 2N3053)	28480	1854-0090
A2U7	1853-0041	4	TSTR:SI PNP	02735	38640
A2O8	1854-0072	1	TSTR:SI NPN	80131	2N3054
A2O9	1853-0303	1	TSTR:SI PNP	80131	2N5956
A2u10	1854-0039	2	TSTR:SI NPN	80131	2N3053
A2O11	1853-0041		TSTR:SI PNP	02735	38640
A2R1	0757-0280		R:FXD MET FLM 1K OHM 1% 1/8W	28480	0757-0280
A2K2	0683-1065	2	R:FXD COMP 10M OHM 5% 1/4W	01121	C8 1065
A2R3	0698-7494	6	R:FXD FLM 34.8K OHM 1.0% 1/8W	28480	0698-7494
A2K4	0698-7494		R:FXD FLM 34.8K OHM 1.0% 1/8W	28480	0698-7494
A2K5	0698-3152	2	R:FXD MET FLM 3.48K OHM 1% 1/8W	28480	0698-3152
A2K6	0751-0398	2	R:FXD MET FLM 75 OHM 1% 1/8W	28480	0757-0398
A2R7	T-05753	4	R:VAR 50 OHM 20K 20 TURN	28480	T-05753
A2R8	0757-0444	3	R:FXD MET FLM 12-1K OHM 1% 1/8W	28480	0757-0444
A2K9	0757-0278	3	R:FXD MET FLM 1.78K OHM 1% 1/8W	28480	0757-0278
A2R10	0811-3153	2	R:VAR FLM 20K OHM 10% LIN 1/2W	28480	0811-3153
A2K11	0811-3156	2	R:FXD COMP 13 MEGOHM 5% 1/2W	01121	EB 1365
A2R12	0757-0442	11	R:FXD MET FLM 10.0K OHM 1% 1/8W	28480	0757-0442
A2K13	0757-0442		R:FXD MET FLM 10.0K OHM 1% 1/8W	28480	0757-0442
A2R14	0698-5846	4	R:FXD COMP 13 MEGOHM 5% 1/2W	01121	EB 1365
A2R15	2100-2030	2	R:VAR FLM 20K OHM 10% LIN 1/2W	28480	2100-2030
A2K16	0698-5846		R:FXD COMP 13 MEGOHM 5% 1/2W	01121	EB 1365
A2R17	0698-3161	2	R:FXD MET FLM 38.3K OHM 1% 1/8W	28480	0698-3161
A2K18	0698-3161		R:FXD MET FLM 38.3K OHM 1% 1/8W	28480	0698-3161
A2R19	0698-6619	4	R:FXD FLM 15K OHM 0-1% 1/8W	28480	0698-6619
A2K20	0757-0440	4	R:FXD MET FLM 7.50K OHM 1% 1/8W	28480	0757-0440
A2K21	0757-0440		R:FXD MET FLM 7.50K OHM 1% 1/8W	28480	0757-0440
A2R22	0698-6619		R:FXD FLM 15K OHM 0-1% 1/8W	28480	0698-6619
A2R23	0698-7494		R:FXD FLM 34.8K OHM 1.0% 1/8W	28480	0698-7494
A2R24	0757-0290	2	R:FXD MET FLM 6-19K OHM 1% 1/8W	28480	0757-0290
A2R25	0757-0280		R:FXD MET FLM 1K OHM 1% 1/8W	28480	0757-0280
A2R26	2100-3215	3	R:VAR CERMET 1K OHM 20% 0.5W 4 TURN	28480	2100-3215
A2R27	0698-5556	2	R:FXD FLM 3-3K OHM 1% 1/8W	28480	0698-5556
A2R28	0698-7466	2	R:FXD FLM 31.6K OHM 1.0% 1/8W	28480	0698-7466
A2R29	0757-0279	2	R:FXD MET FLM 3.16K OHM 1% 1/8W	28480	0757-0279
A2K30	0757-0137	1	R:FXD MET FLM 750K OHM 1% 1/2W	28480	0757-0137
A2R31	0757-0397	1	R:FXD MET FLM 68.1 OHM 1% 1/8W	28480	0757-0397
A2A32	0757-0416	1	R:FXD MET FLM 511 OHM 1% 1/8W	28480	0757-0416
A2R33	2100-1986	2	R:VAR CERMET 1000 OHM 10% LIN 1/2W	28480	2100-1986
A2K34	0757-0394	2	R:FXD MET FLM 51.1 OHM 1% 1/8W	28480	0757-0394
A2R35	0757-0159	3	R:FXD MET FLM 1000 OHM 1% 1/2W	28480	0757-0159
A2K36	2100-1788	2	R:VAR FLM 500 OHM 10% LIN 1/2W	28480	2100-1788
A2R37	0757-0444		R:FXD MET FLM 12.1K OHM 1% 1/8W	28480	0757-0444
A2R38	2100-1788		R:VAR FLM 500 OHM 10% LIN 1/2W	28480	2100-1788
A2R39	0757-0439	2	R:FXD MET FLM 6.81K OHM 1% 1/8W	28480	0757-0439
A2R40	0757-0439		R:FXD MET FLM 6.81K OHM 1% 1/8W	28480	0757-0439
A2K41	0757-0442		R:FXD MET FLM 10.0K OHM 1% 1/8W	28480	0757-0442
A2K42	0757-0442		R:FXD MET FLM 10.0K OHM 1% 1/8W	28480	0757-0442
A2R43	0698-3437	2	R:FXD MET FLM 133 OHM 1% 1/8W	28480	0698-3437
A2K44	0698-3437		R:FXD MET FLM 133 OHM 1% 1/8W	28480	0698-3437
A2R45	0757-0442		R:FXD MET FLM 10.0K OHM 1% 1/8W	28480	0757-0442
A2K46	0757-0346	3	R:FXD MET FLM 10 OHM 1% 1/8W	28480	0757-0346
A2K47	0757-0346		R:FXD MET FLM 10 OHM 1% 1/8W	28480	0757-0346
A2K48	0757-0346		R:FXD MET FLM 10 OHM 1% 1/8W	28480	0757-0346
A2K49	0757-0815	2	R:FXD MET FLM 562 OHM 1% 1/2W	28480	0757-0815
A2K50	0757-0815		R:FXD MET FLM 562 OHM 1% 1/2W	28480	0757-0815
A2R51	0757-1094	2	R:FXD MET FLM 1.47K OHM 1% 1/8W	28480	0757-1094
A2R52	0757-1094		R:FXD MET FLM 1.47K OHM 1% 1/8W	28480	0757-1094
A3	07045-60080	1	X-AXIS AMPLIFIER BOARD ASSY	28480	07045-60080
A3C1	0160-0161		C:FXD MY 0.01 UF 10% 200VDCW	56289	192P10392-PTS
A3C2	0160-0157		C:FXD MY 0.0047 UF 10% 200VDCW	56289	192P47292-PTS
A3C3	0160-2207		C:FXD MICA 300 PF 5%	28480	0160-2207
A3C4	0160-2207		C:FXD MICA 300 PF 5%	28480	0160-2207
A3C5	0160-2207		C:FXD MICA 300 PF 5%	28480	0160-2207

See introduction to this section for ordering information

TABLE 6-4. PARTS LIST – MODEL 7045A (Continued)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A3C6	0180-2133	1	C:FXD ELECT 0.18 UF 10Z 35VDCW	28480	0180-2133
A3C7	0140-0190	1	C:FXD MICA 39 PF 5%	72136	RDM15E390J3C
A3C8	0180-0197		C:FXD ELECT 2.2 UF 10Z 20VDCW	56289	1500225X9020A2-DYS
A3C9	0180-0197		C:FXD ELECT 2.2 UF 10% 20VDCW	56289	1500225X9020A2-DYS
A3C10	0160-0819		C:FXD MY 0.047 UF 10Z 600VDCW	14655	WKF-6547
A3C11	0180-0291		C:FXD ELECT 1.0 UF 10% 35VDCW	56289	1500105X9035A2-DYS
A3C12	0180-0291		C:FXD ELECT 1.0 UF 10% 35VDCW	56289	1500105X9035A2-DYS
A3CR1	1901-0376		DIODE:SILICON 35V	28480	1901-0376
A3CR2	1901-0376		DIODE:SILICON 35V	28480	1901-0376
A3CR3	1902-0041		DIODE:BREAKDOWN 5.11V 5%	04713	SZ10939-98
A3CR4	1902-0025		DIODE,BREAKDOWN:10.0V 5% 400 MW	28480	1902-0025
A3CR5	1902-0025		DIODE,BREAKDOWN:10.0V 5% 400 MW	28480	1902-0025
A3CR6	1901-0044		DIODE:SILICON 20MA/IV	28480	1901-0044
A3CR7	1901-0044		DIODE:SILICON 20MA/IV	28480	1901-0044
A3CR8	1902-3110	2	DIODE BREAKDOWN:5.90V 2%	28480	1902-3110
A3CR9	1902-3191	2	DIODE BREAKDOWN:13.0V 2%	28480	1902-3191
A3CR10	1902-3110		DIODE BREAKDOWN:5.90V 2%	28480	1902-3110
A3CR11	1902-3191		DIODE BREAKDOWN:13.0V 2%	28480	1902-3191
A3CR12	1901-0638	1	DIODE ASSY:SI FULL WAVE BRIDGE	28480	1901-0638
A3CR13	1902-0675	2	DIODE:BREAKDOWN 5% 15.4V	28480	1902-0675
A3CR14	1902-0675		DIODE:BREAKDOWN 5% 15.4V	28480	1902-0675
A3CR15	1902-0786	3	DIODE:T.C. REFERENCE JEDEC TYPE	04713	IN937
A3CR16	1902-0786		DIODE:T.C. REFERENCE JEDEC TYPE	04713	IN937
A3F1	2110-0367	2	FUSE:5.0 AMP 250V	71400	HDA-250-5
A3F2	2110-0367		FUSE:5.0 AMP 250V	71400	HDA-250-5
A3IC1	1820-0223		INTEGRATED CIRCUIT:OPERATIONAL AMPL.	28480	1820-0223
A3IC2	1820-0223		INTEGRATED CIRCUIT:OPERATIONAL AMPL.	28480	1820-0223
A3IC3	1820-0223		INTEGRATED CIRCUIT:OPERATIONAL AMPL.	28480	1820-0223
A3IC4	1820-0223		INTEGRATED CIRCUIT:OPERATIONAL AMPL.	28480	1820-0223
A3L1	9170-0016		BEAD:MAGNETIC SHIELDING	02114	56-590-65/3B
A3L2	9170-0016		BEAD:MAGNETIC SHIELDING	02114	56-590-65/3B
A3U1	1855-0376		TSTR:DUAL FET SI N-CHANNEL	28480	1855-0376
A3U2	1854-0071		TSTR:SI NPN(Selected From 2N3704)	28480	1854-0071
A3U3	1854-0071		TSTR:SI NPN(Selected From 2N3704)	28480	1854-0071
A3U4	1854-0087		TSTR:SI NPN	80131	2N3417
A3U5	1853-0042	1	TSTR:SI PNP	28480	1853-0042
A3U6	1853-0041		TSTR:SI PNP	02735	38640
A3U7	1854-0090		TSTR:SI NPN(Similar To 2N3053)	28480	1854-0090
A3U8	1854-0039		TSTR:SI NPN	80131	2N3053
A3U9	1853-0041		TSTR:SI PNP	02735	38640
A3R1	0757-0280		R:FXD MET FLM 1K OHM 1% 1/8W	28480	0757-0280
A3R2	0683-1065		R:FXD COMP 10M OHM 5% 1/4W	01121	CB 1065
A3R3	0698-7494		R:FXD FLM 34.8K OHM 1.0% 1/8W	28480	0698-7494
A3R4	0698-7494		R:FXD FLM 34.8K OHM 1.0% 1/8W	28480	0698-7494
A3R5	0698-3152		R:FXD MET FLM 3.48K OHM 1% 1/8W	28480	0698-3152
A3R6	0757-0398		R:FXD MET FLM 75 OHM 1% 1/8W	28480	0757-0398
A3R7	T-05753		R:VAR 50 OHM 20% 20 TURN	28480	T-05753
A3R8	0757-0444		R:FXD MET FLM 12.1K OHM 1% 1/8W	28480	0757-0444
A3R9	0757-0278		R:FXD MET FLM 1.78K OHM 1% 1/8W	28480	0757-0278
A3R10	0811-3153		R:FXD WW 166.67 OHM 0.05% 1/32W	28480	0811-3153
A3R11	0811-3156		R:FXD WW 833.33 OHM 0.05% 1/8W	28480	0811-3156
A3R12	0757-0442		R:FXD MET FLM 10.0K OHM 1% 1/8W	28480	0757-0442
A3R13	0757-0442		R:FXD MET FLM 10.0K OHM 1% 1/8W	28480	0757-0442
A3R14	0698-5846		R:FXD COMP 13 MEGOHM 5% 1/2W	01121	EB 1365
A3R15	2100-2030		R:VAR FLM 20K OHM 10% LIN 1/2W	28480	2100-2030
A3R16	0698-5846		R:FXD COMP 13 MEGOHM 5% 1/2W	01121	EB 1365
A3R17	0698-6619		R:FXD FLM 15K OHM 0.1% 1/8W	28480	0698-6619
A3R18	0757-0440		R:FXD MET FLM 7.50K OHM 1% 1/8W	28480	0757-0440
A3R19	0757-0440		R:FXD MET FLM 7.50K OHM 1% 1/8W	28480	0757-0440
A3R20	0698-6619		R:FXD FLM 15K OHM 0.1% 1/8W	28480	0698-6619
A3R21	0698-7494		R:FXD FLM 34.8K OHM 1.0% 1/8W	28480	0698-7494
A3R22	0698-3136	1	R:FXD MET FLM 17.8K OHM 1% 1/8W	28480	0698-3136
A3R23	0757-0280		R:FXD MET FLM 1K OHM 1% 1/8W	28480	0757-0280
A3R24	2100-3215		R:VAR CERMET 1K OHM 20% 1/4W	28480	2100-3215
A3R25	0698-5556		R:FXD FLM 3.3K OHM 1% 1/8W	28480	0698-5556
A3R26	0698-7646		R:FXD FLM 31.6K OHM 1.0% 1/8W	28480	0698-7646
A3R27	0757-0279		R:FXD MET FLM 3.16K OHM 1% 1/8W	28480	0757-0279
A3R28	0757-0064	1	R:FXD FLM 261K OHM 1% 1/2W	28480	0757-0064
A3R29	0757-0401	1	R:FXD MET FLM 100 OHM 1% 1/8W	28480	0757-0401
A3R30	0757-0428		R:FXD MET FLM 1.62K OHM 1% 1/8W	28480	0757-0428
A3R31	2100-2497	1	R:VAR FLM 2000 OHM 10% LIN 1/2W	28480	2100-2497
A3R32	0757-0394		R:FXD MET FLM 51.1 OHM 1% 1/8W	28480	0757-0394
A3R33	0757-0280		R:FXD MET FLM 1K OHM 1% 1/8W	28480	0757-0280
A3R34	0757-0418	2	R:FXD MET FLM 619 OHM 1% 1/8W	28480	0757-0418

See introduction to this section for ordering information

TABLE 6-4. PARTS LIST – MODEL 7045A (Continued)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A3K35	0757-0280		R:FWD MET FLM 1K OHM 1% 1/8W	28480	0757-0280
A3K36	0757-0280		R:FWD MET FLM 1K OHM 1% 1/8W	28480	0757-0280
A3K37	0757-0418		R:FWD MET FLM 619 OHM 1% 1/8W	28480	0757-0418
A3K38	0757-0991	2	R:FWD MET FLM 20.0 OHM 1.0% 1/2W	28480	0757-0991
A3K39	0757-0991		R:FWD MET FLM 20.0 OHM 1.0% 1/2W	28480	0757-0991
A3K40	0757-0427	2	R:FWD MET FLM 1.5K OHM 1% 1/8W	28480	0757-0427
A3K41	0757-0427		R:FWD MET FLM 1.5K OHM 1% 1/8W	28480	0757-0427
A3K42	0683-0515	1	R:FWD COMP 5.1 OHM 5% 1/4W	01121	C4 51G5
A3K43	0757-0159		R:FWD MET FLM 1000 OHM 1% 1/2W	28480	0757-0159
A3K44	0757-0159		R:FWD MET FLM 1000 OHM 1% 1/2W	28480	0757-0159
A3K45	0757-0420	2	R:FWD MET FLM 750 OHM 1% 1/8W	28480	0757-0420
A3K46	0757-0420		R:FWD MET FLM 750 OHM 1% 1/8W	28480	0757-0420
A4	07045-60120	1	TTL BOARD ASSY [OPTION 005]	28480	07045-60120
A4L1	018u-0291		C:FWD ELECT 1.0 UF 10% 35VDCW	56289	1500105X9035A2-DYS
A4C1	1901-0025		DIODE:SILICON 100MA/1V	07263	FD 2387
A4C2	1901-0025		DIODE:SILICON 100MA/1V	07263	FD 2387
A4C3	1901-0025		DIODE:SILICON 100MA/1V	07263	FD 2387
A4C4	1901-0025		DIODE:SILICON 100MA/1V	07263	FD 2387
A4C5	1901-0025		DIODE:SILICON 100MA/1V	07263	FD 2387
A4C6	1901-0025		DIODE:SILICON 100MA/1V	07263	FD 2387
A4C7	1901-0025		DIODE:SILICON 100MA/1V	07263	FD 2387
A4C8	1901-0025		DIODE:SILICON 100MA/1V	07263	FD 2387
A4IC2	1820-0328	2	IC:TTL QUAD 2-INPT NOR GATE	04713	SN7402N
A4L1	0490-0971	7	COIL:REED RELAY 12V 240 MM	71707	UF-12P
A4L2	0490-0971		COIL:REED RELAY 12V 240 MM	71707	UF-12P
A4L3	0490-0971		COIL:REED RELAY 12V 240 MM	71707	UF-12P
A4L4	0490-0971		COIL:REED RELAY 12V 240 MM	71707	UF-12P
A4L5	0490-0971		COIL:REED RELAY 12V 240 MM	71707	UF-12P
A~U1	1854-0071		TSTR:SI NPN (SELECTED FROM 2N3704)	28480	1854-0071
A4J2	1854-0071		TSTR:SI NPN (SELECTED FROM 2N3704)	28480	1854-0071
A4U3	1854-0071		TSTR:SI NPN (SELECTED FROM 2N3704)	28480	1854-0071
A4U4	1854-0071		TSTR:SI NPN (SELECTED FROM 2N3704)	28480	1854-0071
A4K1	0757-0280		R:FWD MET FLM 1K OHM 1% 1/8W	28480	0757-0280
A4R2	0757-0442		R:FWD MET FLM 10.0K OHM 1% 1/8W	28480	0757-0442
A4K3	0757-0280		R:FWD MET FLM 1K OHM 1% 1/8W	28480	0757-0280
A4K4	0757-0442		R:FWD MET FLM 10.0K OHM 1% 1/8W	28480	0757-0442
A4K5	0757-0280		R:FWD MET FLM 1K OHM 1% 1/8W	28480	0757-0280
A4R6	0757-0442		R:FWD MET FLM 10.0K OHM 1% 1/8W	28480	0757-0442
A4K7	0757-0280		R:FWD MET FLM 1K OHM 1% 1/8W	28480	0757-0280
A4R8	0757-0442		R:FWD MET FLM 10.0K OHM 1% 1/8W	28480	0757-0442
A4S1	0490-0778	7	SWITCH:REED MAGNETIC, MINIATURE	28480	0490-0778
A4S2	0490-0778		SWITCH:REED MAGNETIC, MINIATURE	28480	0490-0778
A4S3	0490-0778		SWITCH:REED MAGNETIC, MINIATURE	28480	0490-0778
A4S4	0490-0778		SWITCH:REED MAGNETIC, MINIATURE	28480	0490-0778
A4S5	0490-0778		SWITCH:REED MAGNETIC, MINIATURE	28480	0490-0778
A5	07045-60070	1	TIME BASE BOARD ASSY [OPTION 001]	28480	07045-60070
A5C1	0160-0174	1	C:FWD CER 0.47 UF +80-20% 25VDCW	56289	SC11B7S-CML
A5C2	0160-0377	1	C:FWD POLY 10 UF 10% 50VDCW	84411	X483W4
ASC3	0160-2208	2	C:FWD MICA 330 PF 5% 300VDCW	28480	0160-2208
ASC4	0150-0121	1	C:FWD CER 0.1 UF +80-20% 50VDCW	56289	SC50B1S-CML
ASC5	0180-0291		C:FWD ELECT 1.0 UF 10% 35VDCW	56289	1500105X9035A2-DYS
ASC6	0180-1746	1	C:FWD ELECT 15 UF 10% 20VDCW	28480	0180-1746
ASC7	0180-0374		C:FWD TANT. 10 UF 10% 20VDCW	56289	1500106X9020B2-DYS
ASC8	0160-2208		C:FWD MICA 330 PF 5% 300VDCW	28480	0160-2208
ASC9	0180-1743	1	C:FWD ELECT 0.1 UF 10% 35VDCW	56289	1500104X9035A2-DYS
ASC10	0150-0050	1	C:FWD CER 1000 PF +80-20% 1000VDCW	56289	C0678102E102Z2S6-CDH
ASC11	0150-0093	2	C:FWD CER 0.01 UF +80-20% 100VDCW	72982	801-K800011
ASC12	0150-0093	1	C:FWD CER 0.01 UF +80-20% 100VDCW	72982	801-K800011
ASC13	0180-0039	1	C:FWD ELECT 100 UF +75-25% 25VDCW	56289	30D107G122002-DSM
ASCR1	1902-0786		DIODE:T-C. REFERENCE JEDEC TYPE	04713	1N937
ASCR2	1902-3139	1	DIODE:BREAKDOWN 8.25V 5%	04713	S210939-158
ASCR3	1901-0040	7	DIODE:SILICON 30MA 30VW	07263	FDG1088
ASCR4	1901-0040		DIODE:SILICON 30MA 30VW	07263	FDG1088
ASCR5	1901-0040		DIODE:SILICON 30MA 30VW	07263	FDG1088
ASCR6	1901-0040		DIODE:SILICON 30MA 30VW	07263	FDG1088
ASCR7	1901-0040		DIODE:SILICON 30MA 30VW	07263	FDG1088
ASCR8	1901-0040		DIODE:SILICON 30MA 30VW	07263	FDG1088
ASCR9	1901-0040		DIODE:SILICON 30MA 30VW	07263	FDG1088
ASCR10	1902-3070	1	DIODE:BREAKDOWN 4.22V 5%	28480	1802-3070
ASIC1	1820-0328		IC:TTL QUAD 2-INPT NOR GATE	04713	SN7402N
ASIC2	1820-0054		IC:TTL QUAD 2-INPT NAND GATE	01295	SN7400N
ASIC3	1820-0223		INTEGRATED CIRCUIT:OPERATIONAL AMPL.	28480	1820-0223
ASL1	0490-0971		COIL:REED RELAY 12V 240 MM	71707	UF-12P
ASL2	0490-0971		COIL:REED RELAY 12V 240 MM	71707	UF-12P
ASL3	1855-0301	1	TSTR:SI DUAL FET	80131	ZN5178
ASL4	1854-0071		TSTR:SI NPN (SELECTED FROM 2N3704)	28480	1854-0071

See introduction to this section for ordering information

TABLE 6-4. PARTS LIST – MODEL 7045A (Continued)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A5Q3	1854-0071		TSTR:SI NPN(SELECTED FROM 2N3704)	28480	1854-0071
A5Q4	1854-0071		TSTR:SI NPN(SELECTED FROM 2N3704)	28480	1854-0071
A5Q5	1853-0020	1	TSTR:SI NPN(SELECTED FROM 2N3704)	28480	1853-0020
A5K1	0698-4424	1	R:FXD MET FLM 1400 OHM 1% 1/W	28480	0698-4424
A5K2	2100-3215		R:VAR CERMET 1K OHM 20% 0.5W 4 TURN	28480	2100-3215
A5R3	0698-3442	1	R:FXD MET FLM 237 OHM 1% 1/W	28480	0698-3442
A5R4	0698-3158	2	R:FXD MET FLM 23.7K OHM 1% 1/W	28480	0698-3158
A5R5	0698-3158		R:FXD MET FLM 23.7K OHM 1% 1/W	28480	0698-3158
A5R6	0698-3150	4	R:FXD MET FLM 2.37K OHM 1% 1/W	28480	0698-3150
A5R7	0698-3449	1	R:FXD MET FLM 28.7K OHM 1% 1/W	28480	0698-3449
A5R8	0698-3446	1	R:FXD MET FLM 383 OHM 1% 1/W	28480	0698-3446
A5R9	0757-0290	2	R:FXD MET FLM 6.19K OHM 1% 1/W	28480	0757-0290
A5R10	0698-3445	1	R:FXD MET FLM 348 OHM 1% 1/W	28480	0698-3445
A5R11	0698-3441	1	R:FXD MET FLM 215 OHM 1% 1/W	28480	0698-3441
A5R12	0698-3150		R:FXD MET FLM 2.37K OHM 1% 1/W	28480	0698-3150
A5R13	0698-3150		R:FXD MET FLM 2.37K OHM 1% 1/W	28480	0698-3150
A5R14	0757-0449	1	R:FXD FLM 20K OHM 1% 1/W	28480	0757-0449
A5R15	0757-0438	2	R:FXD MET FLM 5.11K OHM 1% 1/W	28480	0757-0438
A5R16	0757-0280		R:FXD MET FLM 1K OHM 1% 1/W	28480	0757-0280
A5R17	0757-0200	2	R:FXD MET FLM 5.62K OHM 1% 1/W	28480	0757-0200
A5R18	0757-0290		R:FXD MET FLM 6.19K OHM 1% 1/W	28480	0757-0290
A5K19	0757-0200		R:FXD MET FLM 5.62K OHM 1% 1/W	28480	0757-0200
A5R20	0757-0419	1	R:FXD MET FLM 681 OHM 1% 1/W	28480	0757-0419
A5R21	0757-0458	1	R:FXD MET FLM 51.1K OHM 1% 1/W	28480	0757-0458
A5R22	0698-3150		R:FXD MET FLM 2.37K OHM 1% 1/W	28480	0698-3150
A5K23	0757-0428		R:FXD MET FLM 1.62K OHM 1% 1/W	28480	0757-0428
A5K24	0698-3458	1	R:FXD MET FLM 348K OHM 1% 1/W	28480	0698-3458
A5K25	0757-0438		R:FXD MET FLM 5.11K OHM 1% 1/W	28480	0757-0438
A5R26	2100-1986		R:VAR CERMET 1000 OHM 10% LIN 1/2W	28480	2100-1986
ASS1	0490-0778		SWITCH=REED MAGNETIC, MINIATURE	28480	0490-0778
A5S2	0490-0778		SWITCH=REED MAGNETIC, MINIATURE	28480	0490-0778
A1	07040-60200	1	OPTION 002-EVENT MARKER	28480	07040-60200
A1C4	0180-1985	1	Y-AXIS DC AMPLIFIER BOARD-STANDARD	56289	390507G030FL4-DSB
A1CR8	1901-0191		C:FXD ELECT 500 UF +75-10% 30VDCW DIODE:SILICON 0.75A 100PIV	04713	SR1358-2
A1Q1	1854-0071		TSTR:SI NPN(SELECTED FROM 2N3704)	28480	1854-0071
A1Q2	1854-0370		TSTR:SI NPN	80131	2N5294
A1R4	0698-3615	1	R:FXD MET DX 47 OHM 5% 2W	28480	0698-3615
A1R6	0698-3403		R:FXD MET FLM 348 OHM 1% 1/W	28480	0698-3403
A1R7	0698-0085		R:FXD MET FLM 2.61K OHM 1% 1/W	28480	0698-0085
A1R8	0757-0428		R:FXD MET FLM 1.62K OHM 1% 1/W	28480	0757-0428
			X-AXIS RETRANSMITTING POTENTIOMETER (OPTION 003)		
	5080-8117 07040-60570	1	WIPER ASSEMBLY SLIDEWIRE ASSEMBLY	28480 28480	5080-8117 07040-60570
			Y-AXIS RETRANSMITTING POTENTIOMETER (OPTION 004)		
	5080-8117 07040-60560	1	WIPER ASSEMBLY SLIDEWIRE ASSEMBLY	28480 28480	5080-8117 07040-60560
			METRIC (OPTION 006)		
A2R22	0698-7322	1	R:FXD FLM 4.25K OHM 1% 1/W	19701	MF4C T-9
A3R22	0698-7322	1	R:FXD FLM 4.25K OHM 1% 1/W	19701	MF4C T-9
			REAR CONNECTOR (OPTION 007)		
J1	1251-3162	1	CONNECTOR - RECEPTACLE 37 PIN FEMALE	28480	1251-3162
	1251-0218	2	CONNECTOR POST - PANEL	28480	1251-0218
P1	1251-3062	1	CONNECTOR - MATING 37 PIN MALE	28480	1251-3062
	1251-2368	1	CONNECTOR HOOD	28480	1251-2368
	1251-1029	1	CONNECTOR LOCK	28480	1251-1029

See introduction to this section for ordering information

TABLE 6-5. MISCELLANEOUS PARTS - MODEL 7045A

HP Part No.	Description	Manufacturer	Qty.
X AND Y ATTENUATOR ASSEMBLY - PART NO. 07046-60150			
0698-6353	R1 R:Fxd Flm 50k ohm 0.1% 1/8W	IRC, Inc.	1
0698-6363	R2 R:Fxd Flm 40k ohm 0.1% 1/8W	IRC, Inc.	1
0698-6320	R3 R:Fxd Flm 5k ohm 0.1% 1/8W	Dale Electronics	1
0811-3155	R4 R:Fxd Flm 4k ohm 0.05% 1/32W	Micro-Ohm Corp.	1
0757-0280	R5 R:Fxd Flm 1k ohm 1% 1/8W	IRC, Inc.	1
0698-6305	R6 R:Fxd Flm 900k ohm 0.1% 1/4	IRC, Inc.	1
0811-3199	R7 R:Fxd Flm 90k ohm 0.05% 1/32W	Micro-Ohm Corp.	1
0811-3154	R8 R:Fxd Flm 9k ohm 0.05% 1/32W	Micro-Ohm Corp.	1
0811-3198	R9 R:Fxd Flm 1k ohm 0.05% 1/32W	Micro-Ohm Corp.	1
2100-0978	R10 R:Var 5k ohm 10%	Clarostat Mfg.	1
3100-3063	S2a,b Switch, Rotary	Hewlett-Packard	1
TIME BASE SWITCH ASSEMBLY - PART NO. 07046-60141			
0698-8194	R1 R:Fxd Metal Flm 10M ohm 0.1% 1/2W	Pyrofilm Resistor	1
0698-8193	R2 R:Fxd Metal Flm 8 M ohm 0.1% 1/2W	Pyrofilm Resistor	1
0698-6369	R3 R:Fxd Flm 1 M ohm 0.1% 1/4W	IRC, Inc.	1
0698-6368	R4 R:Fxd Flm 800k ohm 0.1% 1/4W	IRC, Inc.	1
0698-6358	R5 R:Fxd Flm 100k ohm 0.1% 1/8W	IRC, Inc.	1
0698-6688	R6 R:Fxd Flm 99.8k ohm 0.1% 1/8W	Electra Mfg Co.	1
3100-3062	S1 Switch, Rotary	Hewlett-Packard	1
ACCESSORY KIT - PART NO. 07040-60630 - STANDARD			
2110-0312	Fuse, 1A, 250V	Bussman Mfg. Div.	1
9211-0343	Plastic Box	Hewlett-Packard	1
5080-3635	Slidewire Lubricant	Hewlett-Packard	1
5080-3605	Slidewire Cleaner	Hewlett-Packard	1
5081-1190	Disposable Pen, Red	Hewlett-Packard	Pkg of 3
5081-1191	Disposable Pen, Blue	Hewlett-Packard	Pkg of 3
ACCESSORY KIT - PART NO. 07044-60541 - REAR CONNECTOR			
2110-0312	Fuse, 1A, 250V	Bussman Mfg. Div.	1
9211-0343	Plastic Box	Hewlett-Packard	1
5080-3635	Slidewire Lubricant	Hewlett-Packard	1
5080-3605	Slidewire Cleaner	Hewlett-Packard	1
5081-1190	Disposable Pen, Red	Hewlett-Packard	Pkg of 3
5081-1191	Disposable Pen, Blue	Hewlett-Packard	Pkg of 3
1251-1029	Lock, Rack, and Panel	ITT Cannon	1
1251-2368	Hood, Rack and Panel	ITT Cannon	1
1251-3062	Connector, Rack and Panel	ITT Cannon	1
GRAPH PAPER - ENGLISH AND METRIC			
9270-1004	Chart Paper, English, Heavy	Hewlett-Packard	
9270-1005	Chart Paper, English, Light	Hewlett-Packard	
9270-1024	Chart Paper, Metric, Heavy	Hewlett-Packard	
9270-1042	Chart Paper, Metric, Light	Hewlett-Packard	

TABLE 6-5. MISCELLANEOUS PARTS – MODEL 7045A (Continued)

HP Part No.	Description	Manufacturer	Qty.
INK SUPPLIES (MAY BE ORDERED)			
5081-1191	Disposable Pen, Blue	Hewlett-Packard	Pkg of 3
5081-1192	Disposable Pen, Green	Hewlett-Packard	Pkg of 3
5081-1193	Disposable Pen, Black	Hewlett-Packard	Pkg of 3
5081-1190	Disposable Pen, Red	Hewlett-Packard	Pkg of 3
ELECTRONIC COMPONENTS/ASSEMBLIES			
07040-60570	Slidewire Assembly (19.2k) X-axis	Hewlett-Packard	1
07040-60550	Slidewire Assembly (13.1k) Y-axis	Hewlett-Packard	1
5080-8117	Slidewire Wiper Assembly	Hewlett-Packard	2
07045-60090	Y-axis Amplifier Assembly	Hewlett-Packard	1
07045-60080	X-axis Amplifier Assembly	Hewlett-Packard	1
07044-60200	Power Supply Board Assembly (Does not include option parts)	Hewlett-Packard	1
07045-60120	TTL Board Assembly	Hewlett-Packard	1
07045-60070	Time Base Board Assembly	Hewlett-Packard	1
07045-60110	Y-Axis Amplifier Assembly – Metric	Hewlett-Packard	1
07045-60100	X-Axis Amplifier Assembly – Metric	Hewlett-Packard	1
MAINFRAME COMPONENTS			
1400-0084	F1 Fuse, Holder	Littlefuse, Inc.	1
2110-0312	F1 Fuse, 1A (for 230V operation)	Littlefuse, Inc.	1
2110-0002	F1 Fuse, 2A (for 115V operation)	Littlefuse, Inc.	1
1251-2357	P1 Ac Receptacle	Switchcraft, Inc.	1
0491-0059	L1 Solenoid Assembly	Ledex	1
3101-1234	S2 Switch, DPDT	Switchcraft	1
07045-60140	T1 Power Transformer	Hewlett-Packard	1
8120-1378	J1 Power Cord	Belden Corp	1
5060-6627	X Motor Assembly	Hewlett-Packard	1
5060-6608	Y Motor Assembly	Hewlett-Packard	1
2100-2682	R11 Potentiometer, 10k, 10 turn	Beckman	1
07040-60560	Y Slidewire – Retrans	Hewlett-Packard	1
5080-8117	Wiper Assembly	Hewlett-Packard	1
07040-60570	X Slidewire – Retrans	Hewlett-Packard	1
5080-8117	Wiper Assembly	Hewlett-Packard	1
07040-60570	R12 X Slidewire	Hewlett-Packard	1
5080-8117	Wiper Assembly	Hewlett-Packard	1
07040-60550	R12 Y Slidewire	Hewlett-Packard	1
5080-8117	Wiper Assembly	Hewlett-Packard	1
07040-60921	Clamp, Shipping	Hewlett-Packard	1
4040-0879	Cover, Dust, Plastic	Hewlett-Packard	1

TABLE 6-6. ONE YEAR ISOLATED SPARE PARTS LIST – MODEL 7045A

Ref. Designation	HP Part No.	Description	Qty.
A2C13,14}			
A3C8,9	0180-0197	Capacitor, 2.2 uF, 20 V	1
A2C18,19}			
A3C11,12}	0180-0291	Capacitor, 1 uF, 35 V	1
A1C6	0180-0374	Capacitor, 10 uF, 20 V	1
A1C3,5	0180-2240	Capacitor, 2400 uF, 25 V	1
A2C16,17	0180-2496	Capacitor, 3200 uF, 40 V	1
A3R43,44	0757-0159	Resistor, 1 k ohm	1
A3R45,46	0757-0420	Resistor, 75 ohms	1
A1R13	0757-0814	Resistor, 511 ohms	1
A2R49,50	0757-0815	Resistor, 562 ohms	1
A2R51,52	0757-1094	Resistor, 1.47 k ohms	1
A1IC1	1820-0054	Integrated Circuit	1
A2IC1,2,3,4,5,6,7}			
A3IC1,2,3,4	1820-0223	Integrated Circuit, Linear Amp	2
A2Q4	1853-0036	Transistor	1
A2Q7,11}			
A3Q6,9	1853-0041	Transistor	1
A3Q5	1853-0042	Transistor	1
A2Q9	1853-0303	Transistor	1
A1Q5	1854-0003	Transistor	1
A2Q10}			
A3Q8	1854-0039	Transistor	1
A1Q4			
A2Q2,3}	1854-0071	Transistor	2
A3Q2,3			
A2Q8	1854-0072	Transistor	1
A2Q5}			
A3Q4}	1854-0087	Transistor	1
A2Q6}			
A3Q7}	1854-0090	Transistor	1
A1Q3	1854-0370	Transistor	1
A2Q1}			
A3Q1}	1855-0376	Transistor, Dual FET	1
A2CR12,13,14,15	1901-0025	Diode	1
A2CR6,7			
A3CR6,7	1901-0044	Diode	2
A1CR1,2,3,4,9	1901-0191	Diode	4
A2CR16	1901-0363	Diode	1
A2CR1,2	1901-0376	Diode	2
A3CR1,2			
A1CR5,6	1901-0470	Diode	2
A2CR4,5			
A3CR4,5	1902-0025	Diode, 10 V, Zener	2
A2CR3			
A3CR3	1902-0041	Diode, 5.11 V, Zener	1
A3CR13, 14	1902-0675	Diode, 15.4 V, Zener	1
A2CR17, 18	1902-0679	Diode, 17.4 V, Zener	1
A2CR19,20	1902-0777	Diode, 6.2 V, Zener	1
A3CR15,16	1902-0786	Diode, 9.0 V, Zener	1
A2CR8, 10	1902-3094	Diode, 5.11 V, Zener	1
A1CR7	1902-3107	Diode, 5.76 V, Zener	1
A3CR8, 10	1902-3110	Diode, 5.9 V, Zener	1
A2CR9, 11	1902-3172	Diode, 11.0 V, Zener	1
A3CR9,11	1902-3191	Diode, 13.0 V, Zener	1
A2R36,38	2100-1788	Resistor, Variable, 500 ohms	1

TABLE 6-6. ONE YEAR ISOLATED SPARE PARTS LIST – MODEL 7045A (Continued)

Ref. Designation	HP Part No.	Description	Qty.
A2R33	2100-1986	Resistor, Variable 1 k ohm	1
A2R15	2100-2030	Resistor, Variable, 20 k ohm	1
A3R31	2100-2497	Resistor, Variable, 2 k ohm	1
A2R26 } A3R24 }	2100-3215	Resistor, Variable, 1 k ohm	1
A1F1	2110-0003	Fuse, 3 A, Normal Blow	5
A2F1,2	2110-0059	Fuse, 1.5 A, Slow Blow	10
A3F1,2	2110-0367	Fuse, 5 A, Slow Blow	10
	0510-0262	Retaining Ring	2
	1410-0215	Ball Bearing	2
	1410-0277	Ball Bearing	2
	1853-0252	Transistor	1
	1854-0063	Transistor	1
	2100-2682	Resistor, Variable, 10 k ohm, 10 Turn	1
	2110-0002	Fuse, 2 A, Normal Blow	10
	3101-1604	Switch, Toggle	1
	3101-1605	Switch, Toggle	1
	3101-1702	Switch, Toggle	2
	8120-1378	Power Cord	1
	5060-6608	Y Servo Motor	1
	5060-6627	X Servo Motor	1
	5080-8117	Wiper Assembly	2
	07040-20550	Drive Gear Y Axis	1
	07046-20490	Drive Gear X Axis	1
	07040-60550	Y Axis Slidewire Assembly	1
	07040-60570	X Axis Slidewire Assembly	1
	07040-60913	Y Axis Drive Cable Assembly	1
	07041-60009	X Axis Drive Cable Assembly	

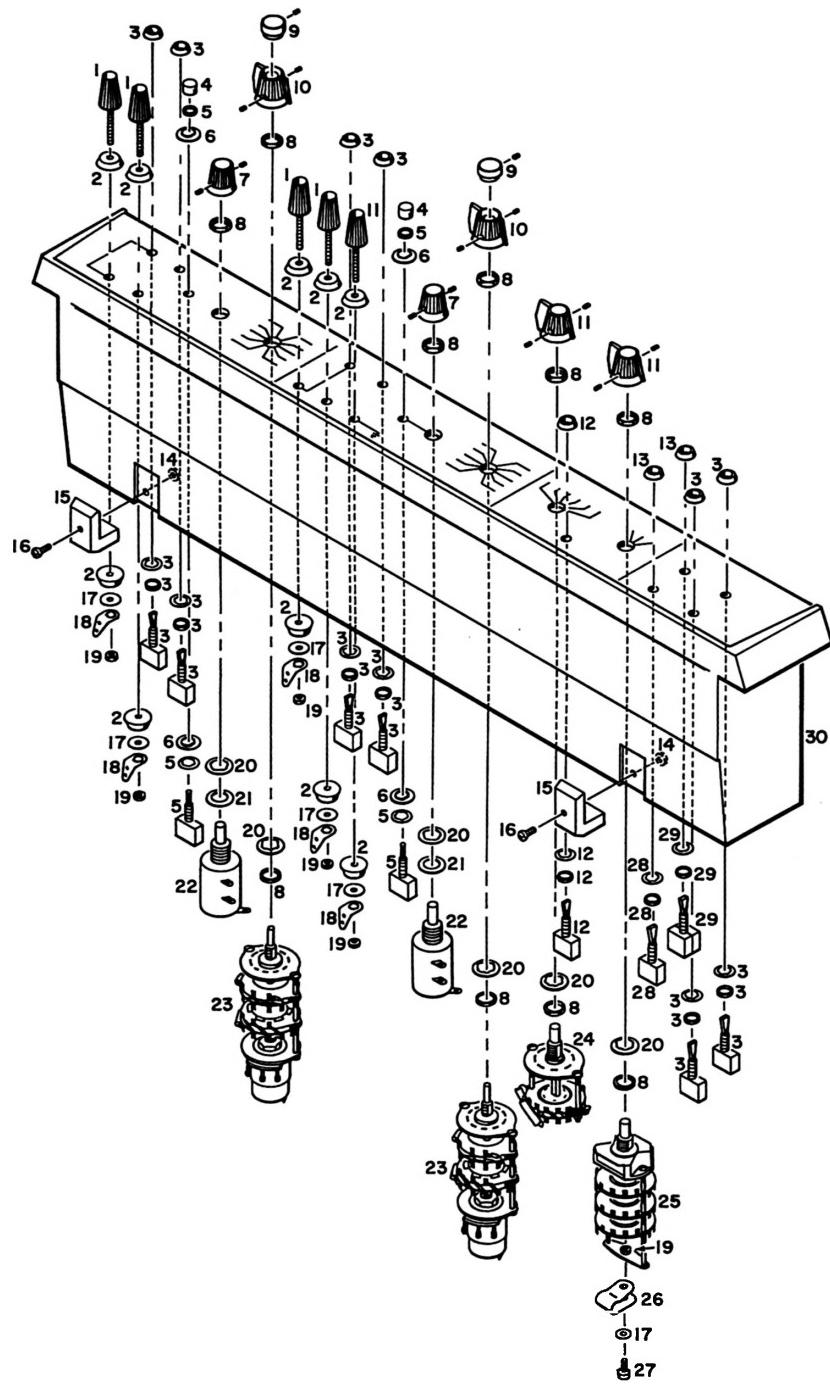


Figure 6-4. Control Panel – Model 7045A (Sheet 1 of 2)

<u>Item</u>	<u>Part No.</u>	<u>Description</u>	<u>Manufacturer</u>
1	1510-0080	Binding Post, Red	Hewlett-Packard
2	0340-0743	Insulator	Hewlett-Packard
3	3101-1702	Switch, Toggle, SPDT	C & K Components
4	3101-1671	Switch, Button, Black Plastic	C & K Components
5	3101-1261	Switch, Pushbutton, SPDT	C & K Components
6	07046-40410	Insulator, Zero Check	Hewlett-Packard
7	0370-1095	Knob, Zero	Hewlett-Packard
8	2950-0043	Nut, Hex, 3/8-32	Fischer Spec Mfg. Co.
9	0370-2192	Knob, Vernier	Hewlett-Packard
10	0370-1881	Knob, Range	Hewlett-Packard
11	0370-1880	Knob, Time Base	Hewlett-Packard
12	3101-1701	Switch, Toggle, SPDT	C & K Components
13	0590-0985	Nut, 1/4-40	C & K Components
14	0510-0195	Locknut, 6-32	Standard Pressed Steel
15	0403-0190	Rubber Foot	Rubbercraft Corp.
16	2360-0085	Screw, Mach, 6-32 x 5/8	Control Screw Co.
17	3050-0399	Washer, Flat, 0.375 OD, 0.032 THK	Hewlett-Packard
18	0360-0365	Terminal, Solder Lug	Shakeproof Div, ITW
19	2420-0010	Nut, Hex, 6-32	Hewlett-Packard
20	2190-0163	Washer, Lock, 0.380 ID	Shakeproof Div, ITW
21	2190-0189	Washer, Flat, 0.375 ID	Shakeproof Div, ITW
22	2100-2682	Potentiometer, 10k, 10T	Beckman
23	07046-60150	Attenuator Assembly	Hewlett-Packard
24	07046-60141	Sweep Rate Assembly	Hewlett-Packard
25	3101-3083	Time Base X Y Off Assembly	Hewlett-Packard
26	0510-0788	Clamp, Plastic Cable	Empire
27	2360-0117	Screw, Mach, Pan, Pozi, 6-32 x 3/8	Indiana Metal Prod. Co.
28	3101-1604	Switch, Toggle, DPDT	C & K Components
29	3101-1605	Switch, Toggle, SPDT	C & K Components
30	07040-21050	Panel, Front	Hewlett-Packard
31	1510-0081	Binding Post, Black	Hewlett-Packard

Figure 6-4. Control Panel – Model 7045A (Sheet 2 of 2)

TABLE 6-7. CODE LIST OF MANUFACTURERS

<u>Mfr. No.</u>	<u>Manufacturer Name</u>	<u>Address</u>	<u>Zip Code</u>
01121	Allen Bradley Company	Milwaukee, Wis.	53204
01295	Texas Instruments Inc. Semiconductor Components Div.	Dallas, Tex.	75231
02114	Ferroxcube Corp.	Saugerties, N.Y.	12477
02735	RCA Solid State and Receiving Tube Div.	Somerville, N.J.	08876
04713	Motorola Semiconductor Prod. Inc.	Phoenix, Ariz.	85008
07263	Fairchild Camera & Inst. Corp. Semiconductor Div.	Mountain View, Calif.	94040
14655	Cornell Dublier Elect. Div. Federal Pacific Elect. Co.	Newark, N.J.	07105
28480	Hewlett-Packard Company	Palo Alto, Calif.	94304
56289	Sprague Electric Co.	N. Adams, Mass.	01247
71400	Bussman Mfg. Div. McGraw-Edison Co.	St. Louis, Mo.	63017
71707	Coto Coil Co. Inc.	Providence, R. I.	02905
72136	Electro Motive Mfg. Co. Inc.	Willimantic, Conn.	06226
72982	Erie Technological Prod. Inc.	Erie, Pa.	16512
80131	Electronic Industries Association	Washington, D. C.	20006
84411	TRW Vapacitor Div.	Ogallala, Nebr.	69153

## **SECTION VII**

### **TROUBLESHOOTING**

#### **7-1. INTRODUCTION.**

#### **7-2. CONTENT.**

7-3. This section contains instructions for troubleshooting the Models 7044A and 7045A. Component location photographs, schematics, and a troubleshooting table are supplied to aid in troubleshooting.

#### **7-4. TROUBLESHOOTING.**

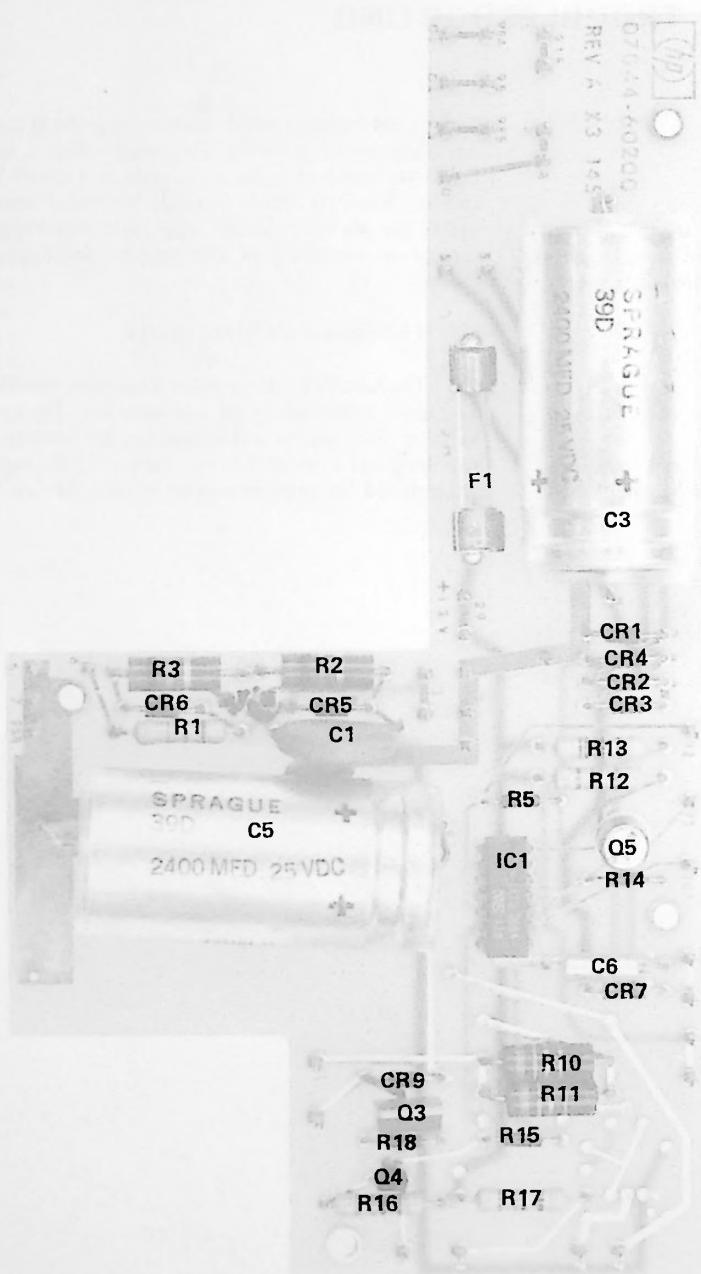
#### **7-5. REQUIREMENTS.**

7-6. Troubleshooting should be performed in a logical manner. The concept of bracketing should be established

such as determining which circuits or sections are not operating or are operating abnormally. This is generally the fastest method to locate trouble in a closed loop circuit. When troubleshooting the individual model, utilize the photographs and schematic presented in the subsection pertaining to that model. See Figures 7-1 through 7-14.

#### **7-7. TROUBLESHOOTING INDEX.**

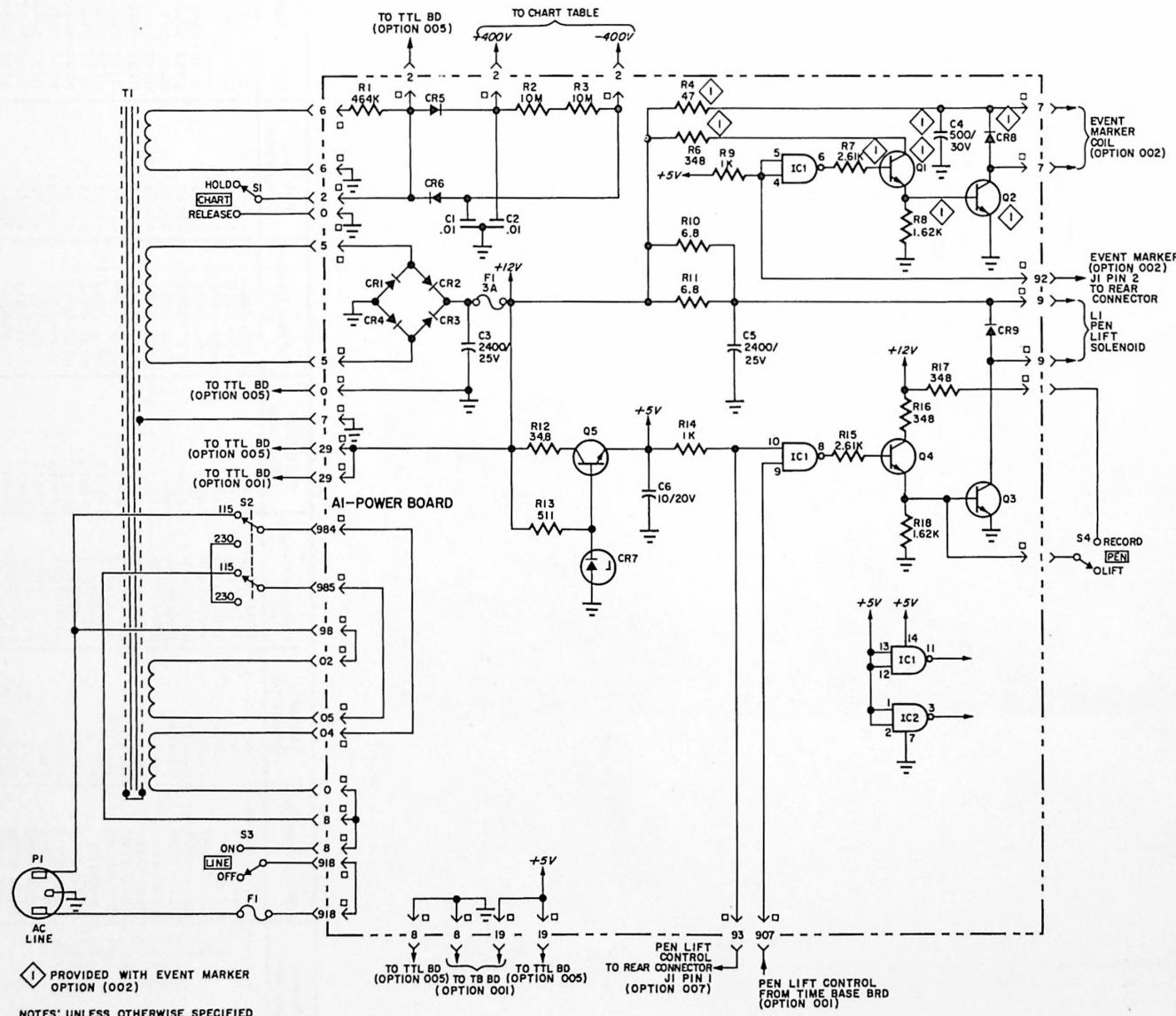
7-8. The troubleshooting index lists other possible malfunctions, suspected causes, and remedies. Use component location photographs and schematics for backup when searching out a problem area. Tables 7-1 through 7-7 are supplied for troubleshooting models 7044A/7045A.

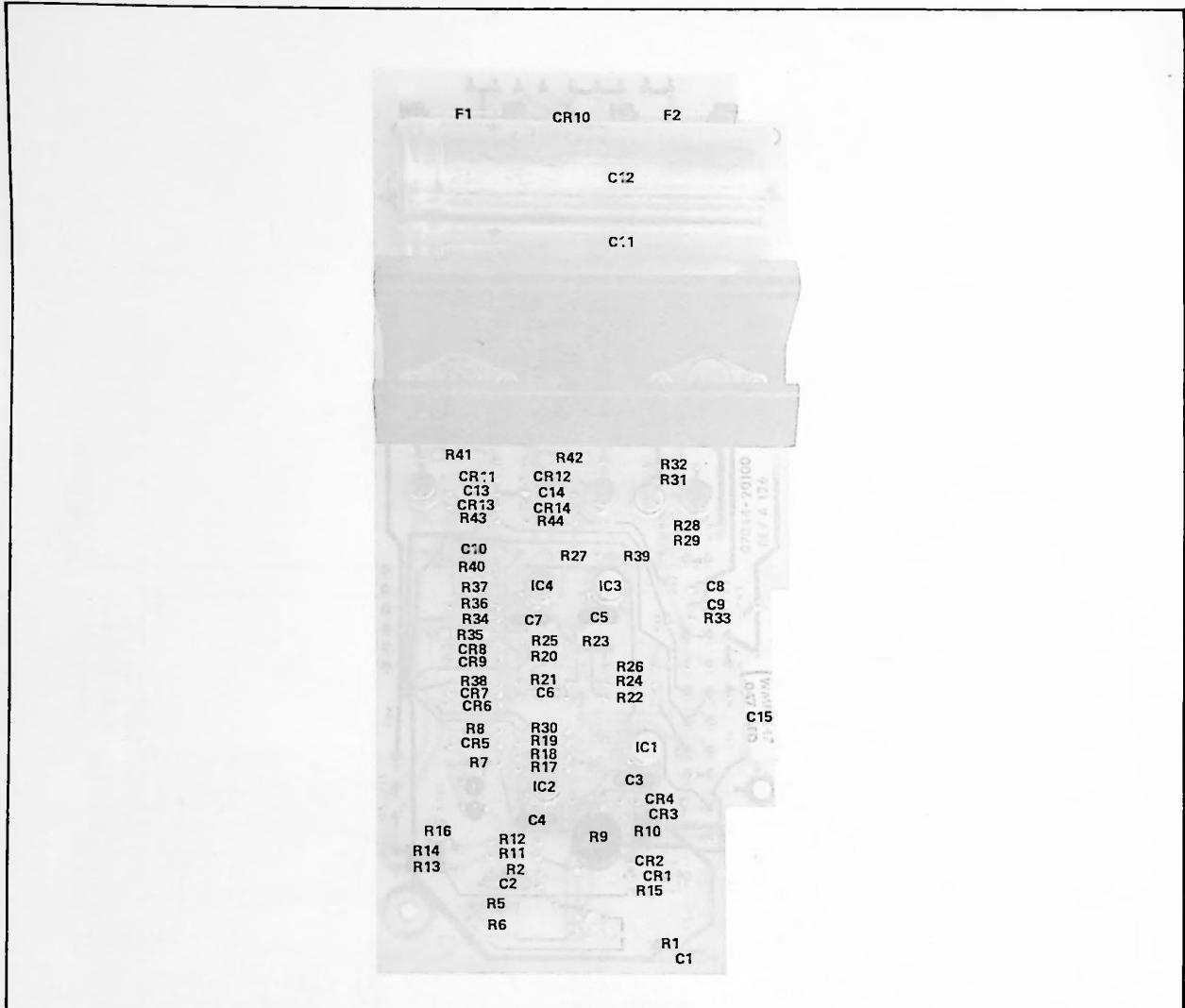


Reference Designation	HP Part Number
A1	07044-60200
A1C1	0150-0119
A1C2	0150-0119
A1C3	0180-2240
A1C5	0180-2240
A1C6	0180-0374
A1CR1	1901-0191
A1CR2	1901-0191
A1CR3	1901-0191
A1CR4	1901-0191
A1CR5	1901-0470
A1CR6	1901-0470
A1CR7	1902-3107
A1CR9	1901-0191
A1C1	1820-0054
A1Q3	1854-0370
A1Q4	1854-0071
A1J5	1854-0003
A1R1	0698-3426
A1F1	21100003
A1R2	0690-1061
A1R3	0690-1061
A1R9	0757-0280
A1R10	0811-1676
A1R11	0811-1676
A1R12	0698-3395
A1K13	0757-0814
A1R14	0757-0280
A1K15	0698-0085
A1R16	0698-3403
A1R17	0698-3403
A1R18	0757-0428

Figure 7-1. Power Supply Circuit Board – Model 7044A/7045A

Figure 7-2. Power Supply Schematic – Model 7044A/7045A

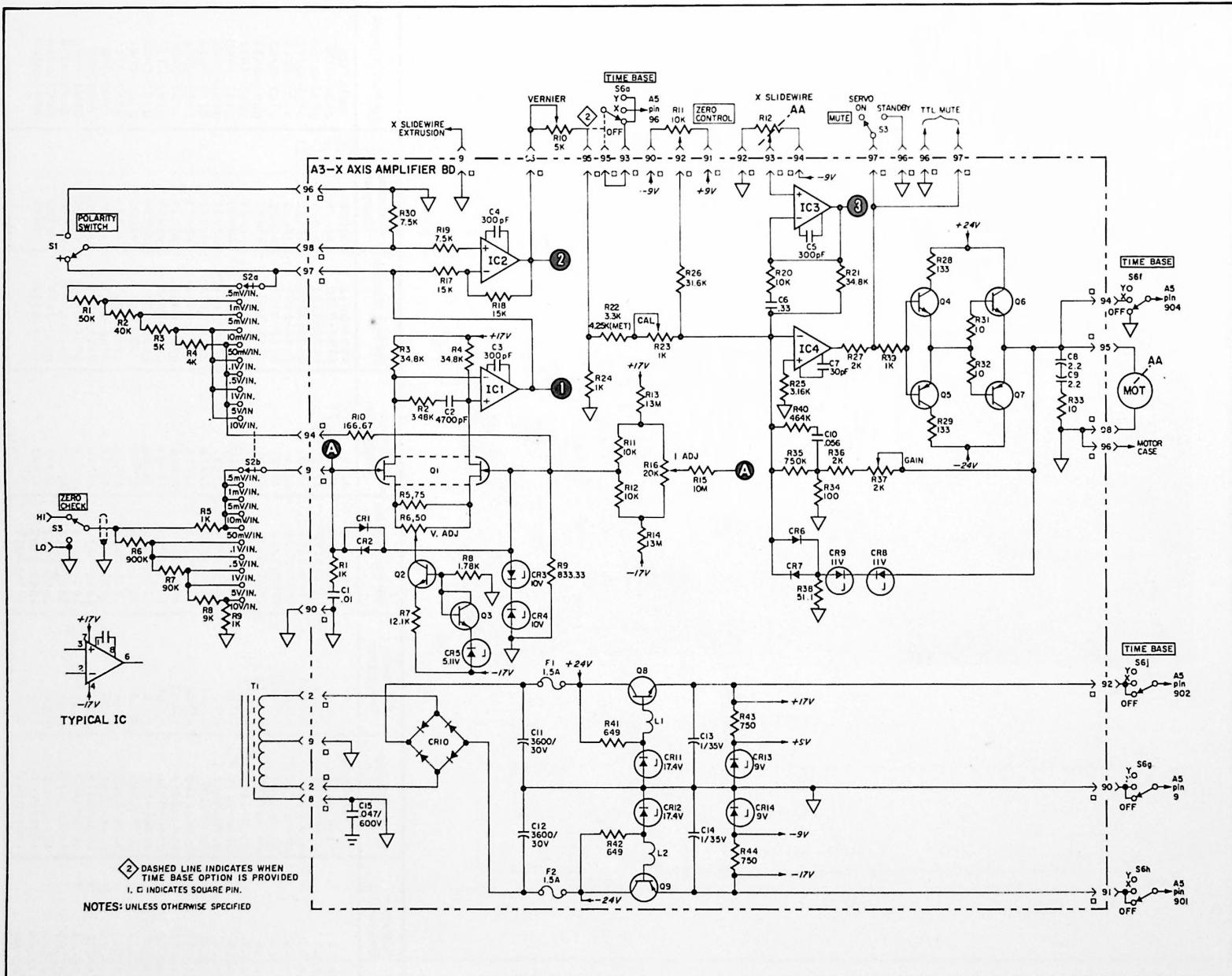


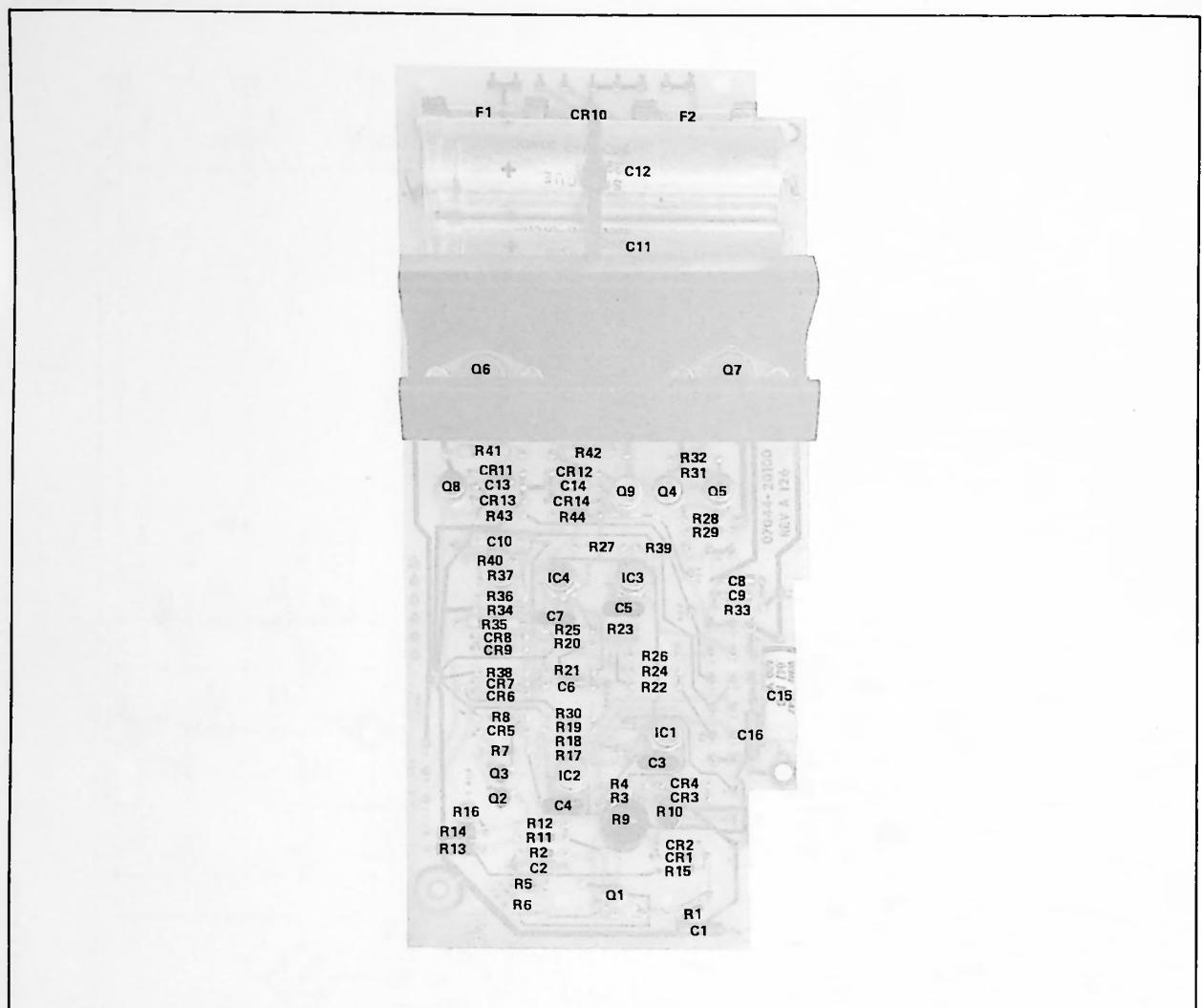


Reference Designation	HP Part Number						
A3	07044-60100	A3CR8	1902-3172	A3R1	0757-0280	A3R23	2100-3215
A3C1	0160-0161	A3CR9	1902-3172	A3R2	0698-3152	A3R24	0757-0280
A3C2	0160-0157	A3CR10	1901-0363	A3R3	0698-7494	A3R25	0757-0279
A3C3	0160-2207	A3CR11	1902-0679	A3R4	0698-7494	A3R26	0690-7646
A3C4	0160-2207	A3CR12	1902-0679	A3R5	0757-0398	A3R27	0757-0283
A3C5	0160-2207	A3CR13	1902-0786	A3R6	2100-3288	A3R28	0698-3437
A3C6	0180-2205	A3CR14	1902-0786	A3R7	0757-0444	A3R29	0690-3437
A3C7	0160-2199	A3F1	2110-0059	A3R8	0757-0278	A3R30	0757-0440
A3C8	0180-0197	A3F2	2110-0059	A3R9	0811-3156	A3R31	0757-0346
A3C9	0180-0197	A3IC1	1820-0223	A3R10	0811-3153	A3R32	0757-0346
A3C10	0160-0165	A3IC2	1820-0223	A3R11	0757-0442	A3R33	0757-0346
A3C11	0180-2340	A3IC3	1820-0223	A3R12	0757-0442	A3R34	0757-0401
A3C12	0180-2340	A3IC4	1820-0223	A3R13	0690-5846	A3R35	0757-0137
A3C13	0180-0291	A3L2	9170-0016	A3R14	0698-5046	A3R36	0757-0283
A3C14	0180-0291	A3U1	1855-0376	A3R15	0683-1065	A3R37	2100-2497
A3C15	0160-0819	A3O2	1854-0071	A3R16	2100-2030	A3R38	0757-0394
A3CR1	1901-0376	A3O3	1854-0071	A3R17	0698-6619	A3R39	0757-0280
A3CR2	1901-0376	A3O4	1854-0039	A3R18	0698-6619	A3R40	0686-3260
A3CR3	1902-0025	A3O5	1853-0012	A3R19	0757-0440	A3R41	0698-4872
A3CR4	1902-0025	A3O6	1854-0072	A3R20	0757-0442	A3R42	0698-4072
A3CR5	1902-0041	A3O7	1853-0303	A3R21	0698-7494	A3R43	0757-0420
A3CR6	1901-0044	A3O8	1854-0039	A3R22	0698-7322	A3R44	0757-0420
A3CR7	1901-0044	A3O9	1853-0041	A3R22	0698-5556	A3R16	2100-2030

Figure 7-3. X-Axis DC Amplifier Circuit Board – 7044A

Figure 7-4. X-Axis DC Amplifier Schematic – 7044A

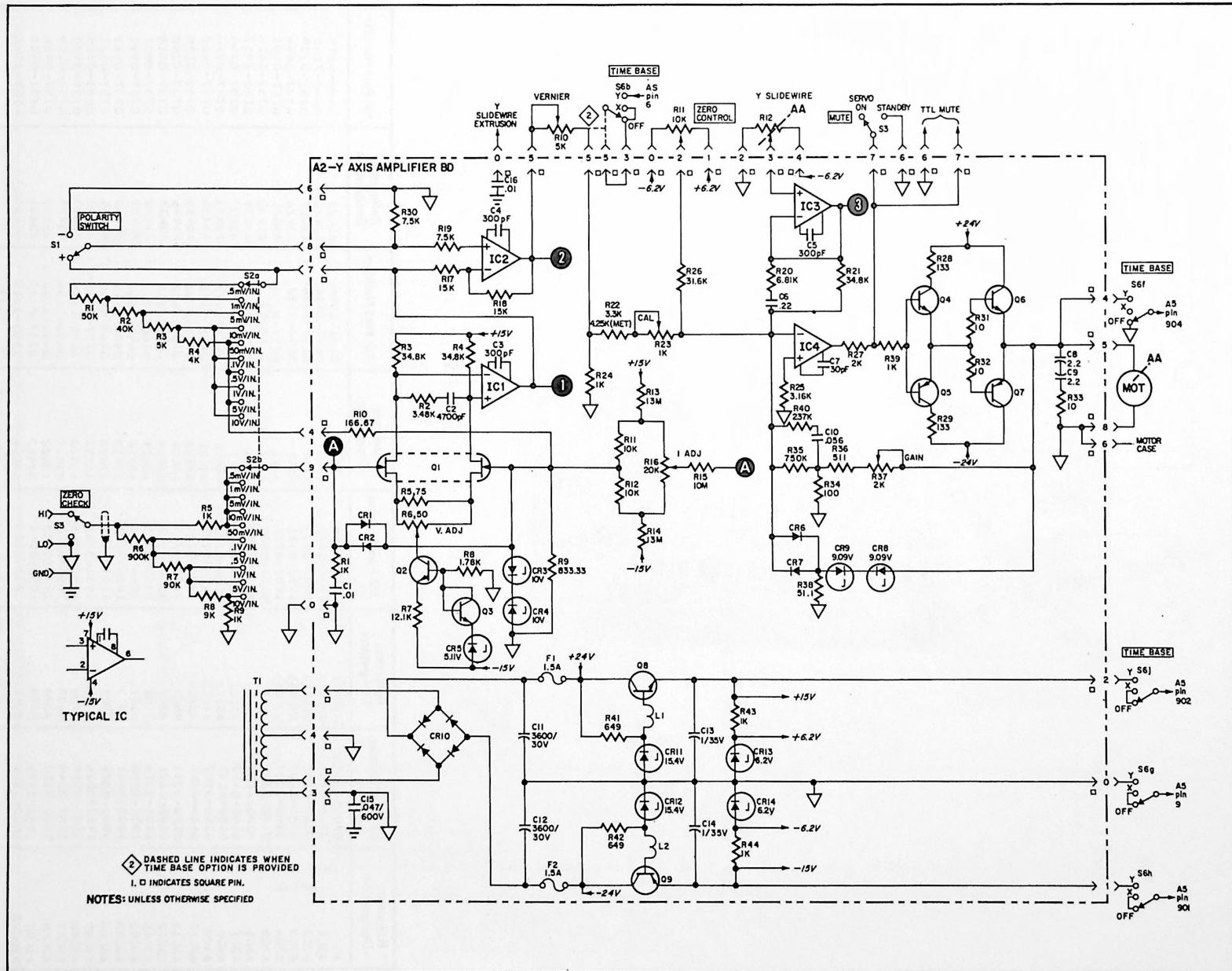


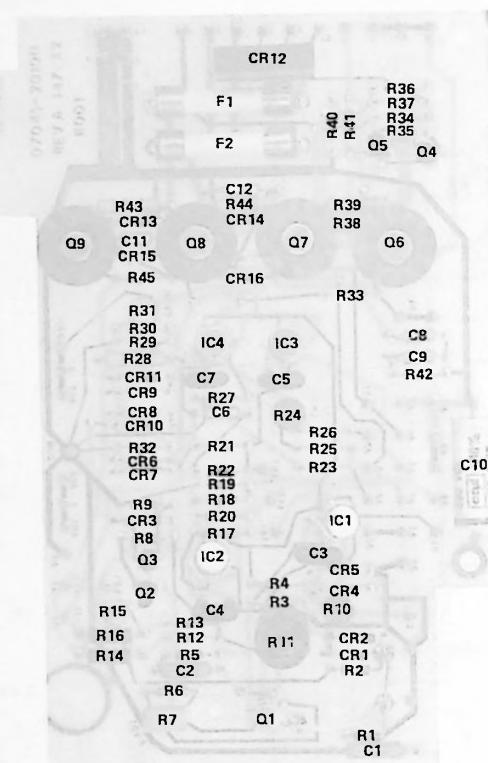


Reference Designation	HP Part Number						
A2	07044-60500	A2CR7	1901-0044	A2Q9	1853-0041	A2R22	0698-7322
A2C1	0160-0161	A2CR8	1902-3150	A2R1	0757-0280	A2R23	2100-3296
A2C2	0160-0157	A2CR9	1902-3150	A2R2	0690-3152	A2R24	0757-0280
A2C3	0160-2207	A2CR10	1901-0363	A2R3	0698-7494	A2R25	0757-0279
A2C4	0160-2207	A2CR11	1902-3208	A2R4	0698-7494	A2R26	0698-7646
A2C5	0160-2207	A2CR12	1902-3208	A2R5	0757-0398	A2R27	0757-0283
A2C6	0180-1735	A2CR13	1902-0777	A2R6	2100-3288	A2R28	0698-3437
A2C7	0160-2199	A2CR14	1902-0777	A2R7	0757-0444	A2R29	0698-3437
A2C8	0180-0197	A2P1	2110-0059	A2R8	0757-0278	A2R30	0757-0440
A2L9	0180-0197	A2P2	2110-0059	A2R9	0811-3156	A2R31	0757-0346
A2C10	0160-0165	A2L1	1920-0223	A2R10	0811-3153	A2R32	0757-0346
A2C11	0180-2340	A2IC2	1820-0223	A2R11	0757-0442	A2R33	0757-0346
A2C12	0180-2340	A2IC3	1820-0223	A2R12	0757-0442	A2R34	0757-0401
A2C13	0180-0291	A2IC4	1820-0223	A2R13	0698-5846	A2R35	0757-0137
A2L14	0180-0291	A2L1	9170-0016	A2R14	0698-5846	A2R36	0757-0416
A2C15	0683-1065	A2L2	9170-0016	A2R15	0683-1065	A2R37	2100-2497
A2C16	0160-0819	A2U1	1855-0376	A2R16	2100-2030	A2R38	0757-0394
A2C17	0160-0161	A2Q2	1854-0071	A2R17	0698-6619	A2R39	0757-0280
A2CR1	1901-0376	A2Q3	1854-0071	A2R18	0698-6619	A2R40	0698-3266
A2CR2	1901-0376	A2Q4	1854-0039	A2R19	0757-0440	A2R41	0698-4872
A2CR3	1902-0025	A2Q5	1853-0012	A2R20	0757-0439	A2R42	0698-4872
A2CR4	1902-0025	A2Q6	1854-0072	A2R21	0698-7494	A2R43	0757-0280
A2CR5	1902-0041	A2Q7	1853-0303	A2R22	0698-5556	A2R44	0757-0280
A2CR6	1901-0044	A2Q8	1854-0039				

Figure 7-5. Y-Axis DC Amplifier Circuit Boards – 7044A

Figure 7-6. Y-Axis DC Amplifier Schematic – 7044A





Reference Designation	HP Part Number						
A3	07045-60080	A3CR12	1901-0638	A3R2	0683-1065	A3R25	0698-5556
A3C1	0160-0161	A3CR13	1902-0675	A3R3	0698-7494	A3R26	0698-7646
A3C2	0160-0157	A3CR14	1902-0675	A3R4	0698-7494	A3R27	0757-0279
A3C3	0160-2207	A3CR15	1902-0786	A3R5	0698-3152	A3R28	0757-0064
A3C4	0160-2207	A3CR16	1902-0786	A3R6	0757-0398	A3R29	0757-0401
A3C5	0160-2207	A3F1	2110-0367	A3R7	I-05753	A3R30	0757-0428
A3C6	0180-2133	A3F2	2110-0367	A3R8	0757-0444	A3R31	2100-2497
A3C7	0140-0190	A3IC1	1820-0223	A3R9	0757-0278	A3R32	0757-0394
A3C8	0180-0197	A3IC2	1820-0223	A3R10	0811-3153	A3R33	0757-0280
A3C9	0180-0197	A3IC3	1820-0223	A3R11	0811-3156	A3R34	0757-0418
A3C10	0160-0819	A3IC4	1820-0223	A3R12	0757-0442	A3R35	0757-0280
A3C11	0180-0291	A3L1	9170-0016	A3R13	0757-0442	A3R36	0757-0280
A3C12	0180-0291	A3L2	9170-0016	A3R14	0698-5846	A3R37	0757-0418
A3CR1	1901-0376	A3U1	1855-0376	A3R15	2100-2030	A3R38	0757-0991
A3CR2	1901-0376	A3O2	1854-0071	A3R16	0698-5846	A3R39	0757-0991
A3CR3	1902-0041	A3-3	1854-0071	A3R17	0698-6619	A3R40	0757-0427
A3CR4	1902-0025	A3D4	1854-0087	A3R18	0757-0440	A3R41	0757-0427
A3CR5	1902-0025	A3O5	1853-0042	A3R19	0757-0440	A3R42	0683-0515
A3CR6	1901-0044	A3U6	1853-0041	A3R20	0698-6619	A3R43	0757-0159
A3CR7	1901-0044	A3O7	1854-0090	A3R21	0698-7494	A3R44	0757-0159
A3CR8	1902-3110	A3O8	1854-0039	A3R22	0698-3136	A3R45	0757-0420
A3CR9	1902-3191	A3O9	1853-0041	A3R23	0757-0280	A3R46	0757-0420
A3CR10	1902-3110	A3K1	0757-0280	A3R24	2100-3215	A3CR11	1902-3191

Figure 7-7. X-Axis DC Amplifier Circuit Board – 7045A

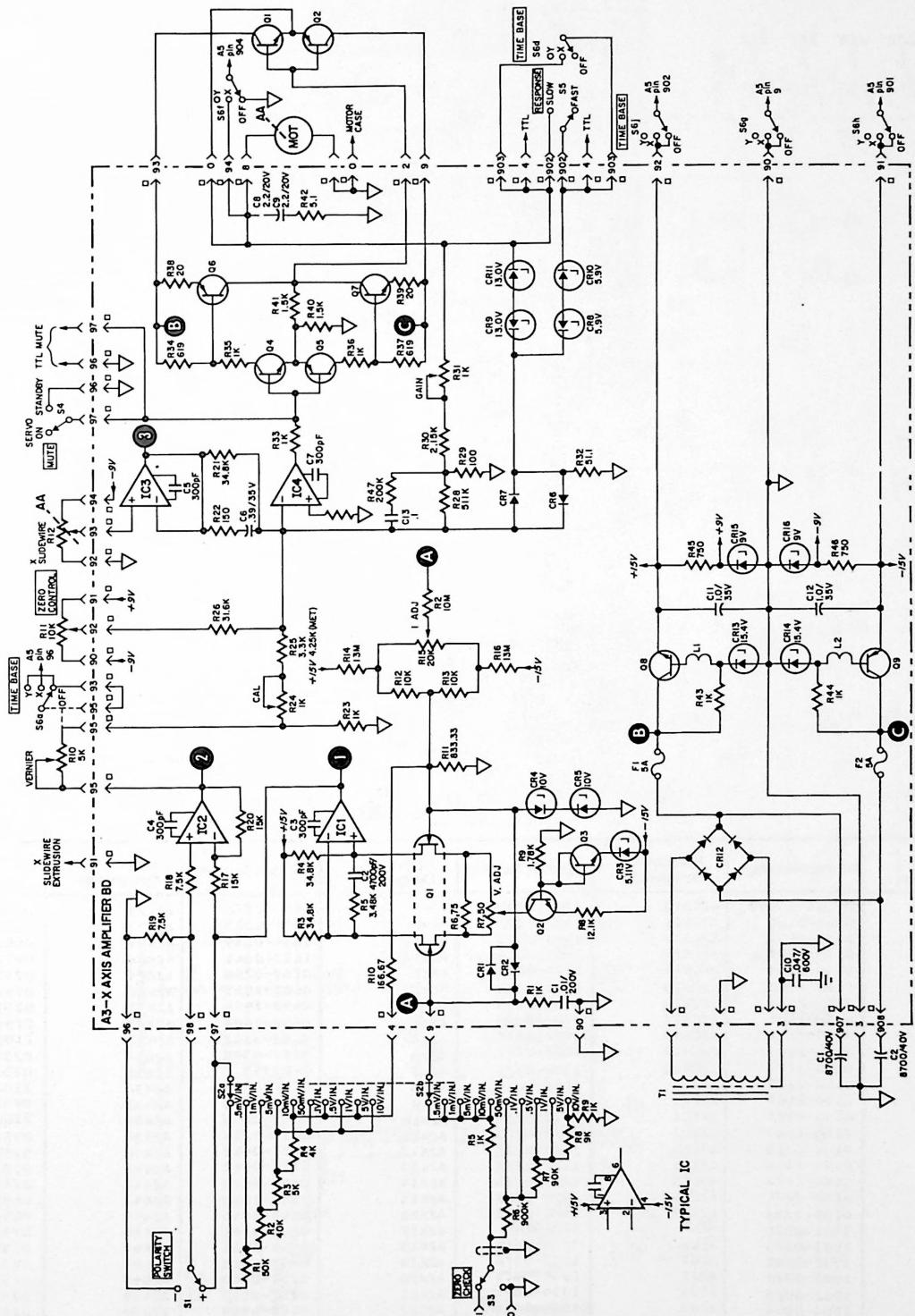
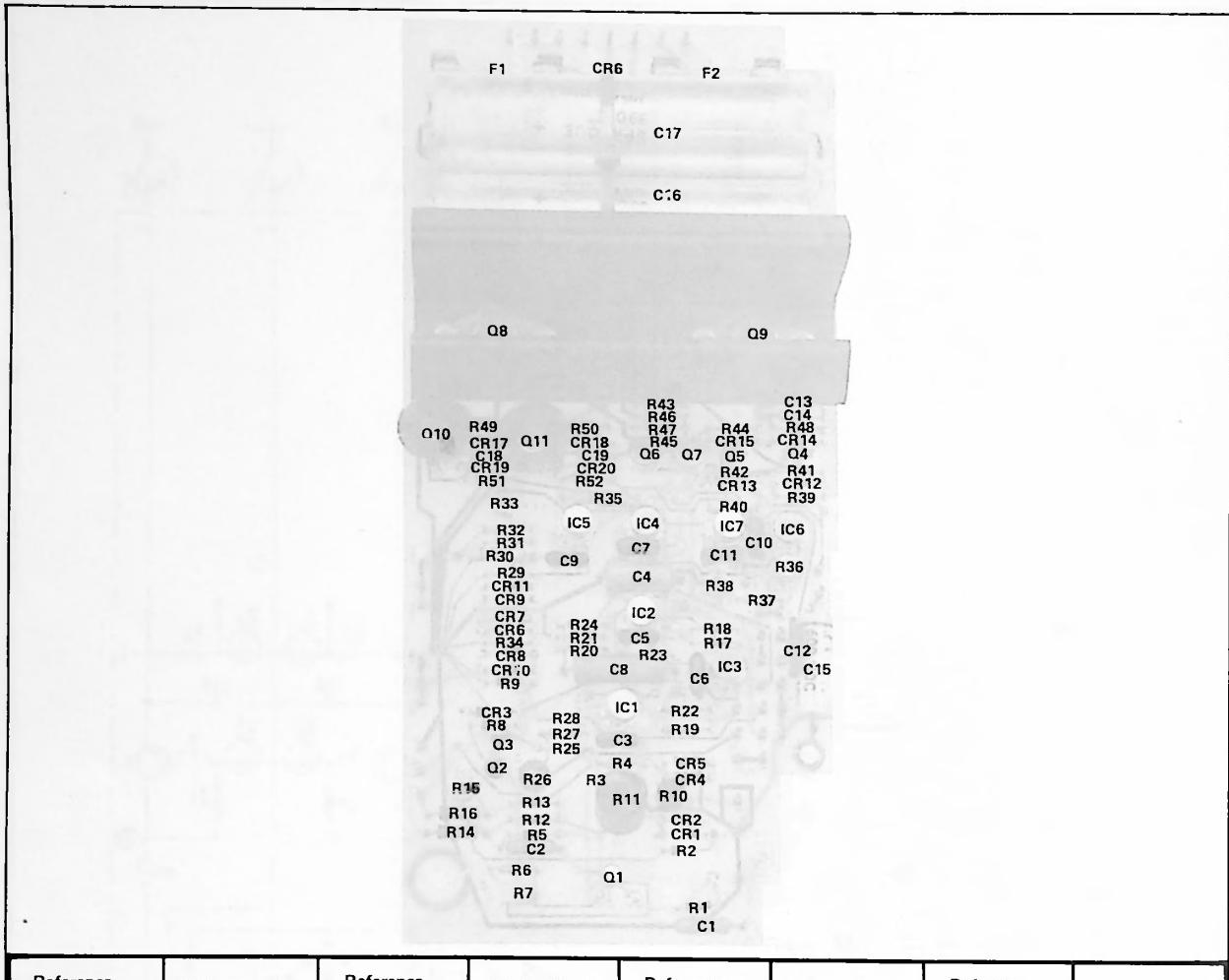


Figure 7-8. X-Axis DC Amplifier Schematic – 7045A



Reference Designation	HP Part Number						
A2	07045-60090	A2CR10	1902-3094	A2U4	1854-0072	A2R25	0757-0280
A2C1	0160-0161	A2CK11	1902-3172	A2U9	1853-0303	A2K26	2100-3215
A2C2	0160-0157	A2CK12	1901-0025	A2U10	1854-0039	A2K27	0698-5556
A2C3	0160-2207	A2CK13	1901-0025	A2U11	1853-0041	A2R28	0698-7646
A2C4	0160-0168	A2CR14	1901-0025	A2R1	0757-0280	A2R29	0757-0279
A2C5	0160-2308	A2CK15	1901-0025	A2R2	0683-1065	A2R30	0757-0137
A2C6	0160-2207	A2CK16	1901-0363	A2R3	0698-7494	A2R31	0757-0397
A2C7	0160-2207	A2CK17	1902-0679	A2R4	0698-7494	A2R32	0757-0416
A2C8	0160-2117	A2CK18	1902-0679	A2R5	0698-3152	A2R33	2100-1986
A2C9	0160-2199	A2CK19	1902-0777	A2K6	0757-0398	A2R34	0757-0394
A2C10	0160-2199	A2CK20	1902-0777	A2K7	T-05753	A2R35	0757-0159
A2C11	0160-2199	A2F1	2110-0059	A2R8	0757-0444	A2R36	2100-1788
A2C12	0150-0081	A2F2	2110-0059	A2K9	0757-0278	A2K37	0757-0444
A2C13	0180-0197	A2IC1	1820-0223	A2R10	0811-3153	A2R38	2100-1788
A2C14	0180-0197	A2IC2	1820-0223	A2K11	0311-3156	A2R39	0757-0439
A2C15	0160-0819	A2IC3	1820-0223	A2R12	0757-0442	A2R40	0757-0439
A2C16	0180-2496	A2IC4	1820-0223	A2K13	0757-0442	A2R41	0757-0442
A2C17	0180-2496	A2IC5	1820-0223	A2R14	0698-5846	A2R42	0757-0442
A2C18	0160-0291	A2IC6	1820-0223	A2R15	2100-2030	A2R43	0698-3437
A2C19	0180-0291	A2IC7	1820-0223	A2K16	0698-5846	A2R44	0698-3437
A2CK1	1901-0376	A2L1	9170-0016	A2R17	0698-3161	A2R45	0757-0442
A2CK2	1901-0376	A2L2	9170-0016	A2K18	0698-3161	A2R46	0757-0346
A2CR3	1902-0041	A2U1	1855-0376	A2R19	0698-6619	A2K47	0757-0346
A2CR4	1902-0025	A2U2	1854-0071	A2R20	0757-0440	A2R48	0757-0346
A2CK5	1902-0025	A2U3	1854-0071	A2R21	0757-0440	A2R49	0757-0815
A2CR6	1901-0044	A2U4	1853-0036	A2R22	0698-6619	A2R50	0757-0815
A2CR7	1901-0044	A2OS	1854-0087	A2R23	0698-7494	A2R51	0757-1094
A2CK8	1902-3094	A2U6	1854-0090	A2R24	0757-0290	A2R52	0757-1094
A2CK9	1902-3172	A2U7	1853-0041				

Figure 7-9. Y-Axis DC Amplifier Circuit Board – 7045A

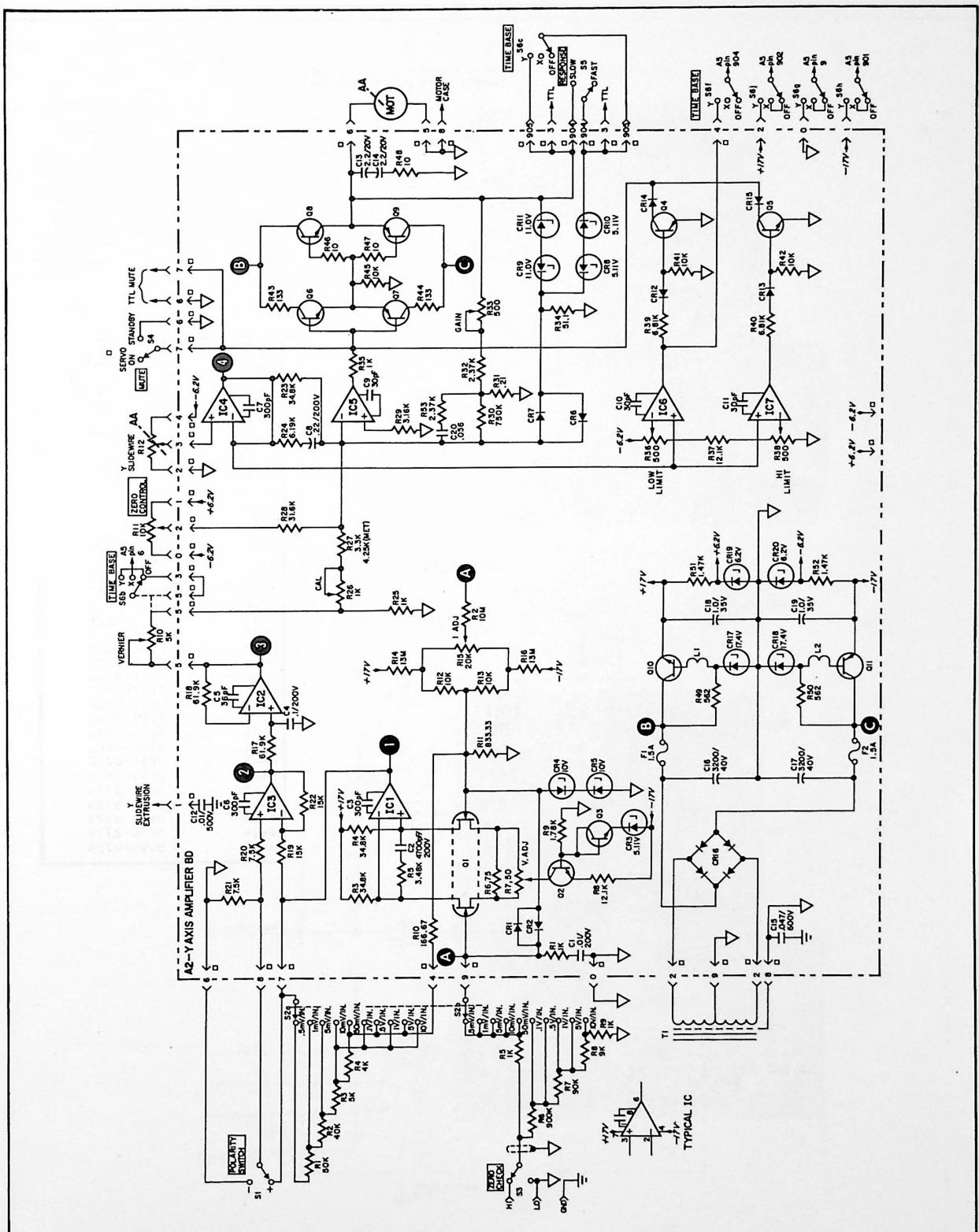
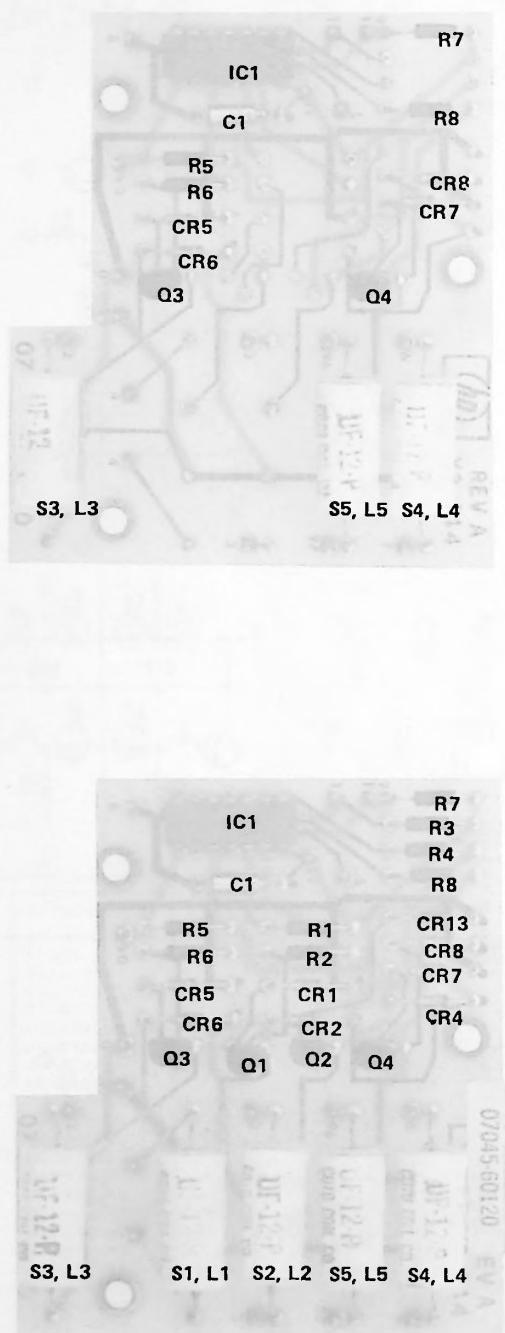


Figure 7-10. Y-Axis DC Amplifier Schematic – 7045A



Reference Designation	HP Part Number
A4	07045-60120
A4C1	0100-0291
A4CR1	1901-0025
A4CR2	1901-0025
A4CR3	1901-0025
A4CR4	1901-0025
A4CR5	1901-0025
A4CR6	1901-0025
A4CR7	1901-0025
A4CR8	1901-0025
A4IC2	1820-0328
A4L1	0490-0971
A4L2	0490-0971
A4L3	0490-0971
A4L4	0490-0971
A4L5	0490-0971
A4Q1	1854-0071
A4Q2	1854-0071
A4Q3	1854-0071
A4Q4	1854-0071
A4R1	0757-0280
A4R2	0757-0442
A4R3	0757-0280
A4R4	0757-0442
A4R5	0757-0280
A4R6	0757-0442
A4R7	0757-0280
A4R8	0757-0442
A4S1	0490-0778
A4S2	0490-0778
A4S3	0490-0778
A4S4	0490-0778
A4S5	0490-0778

Figure 7-11. TTL Circuit Board – Option 005

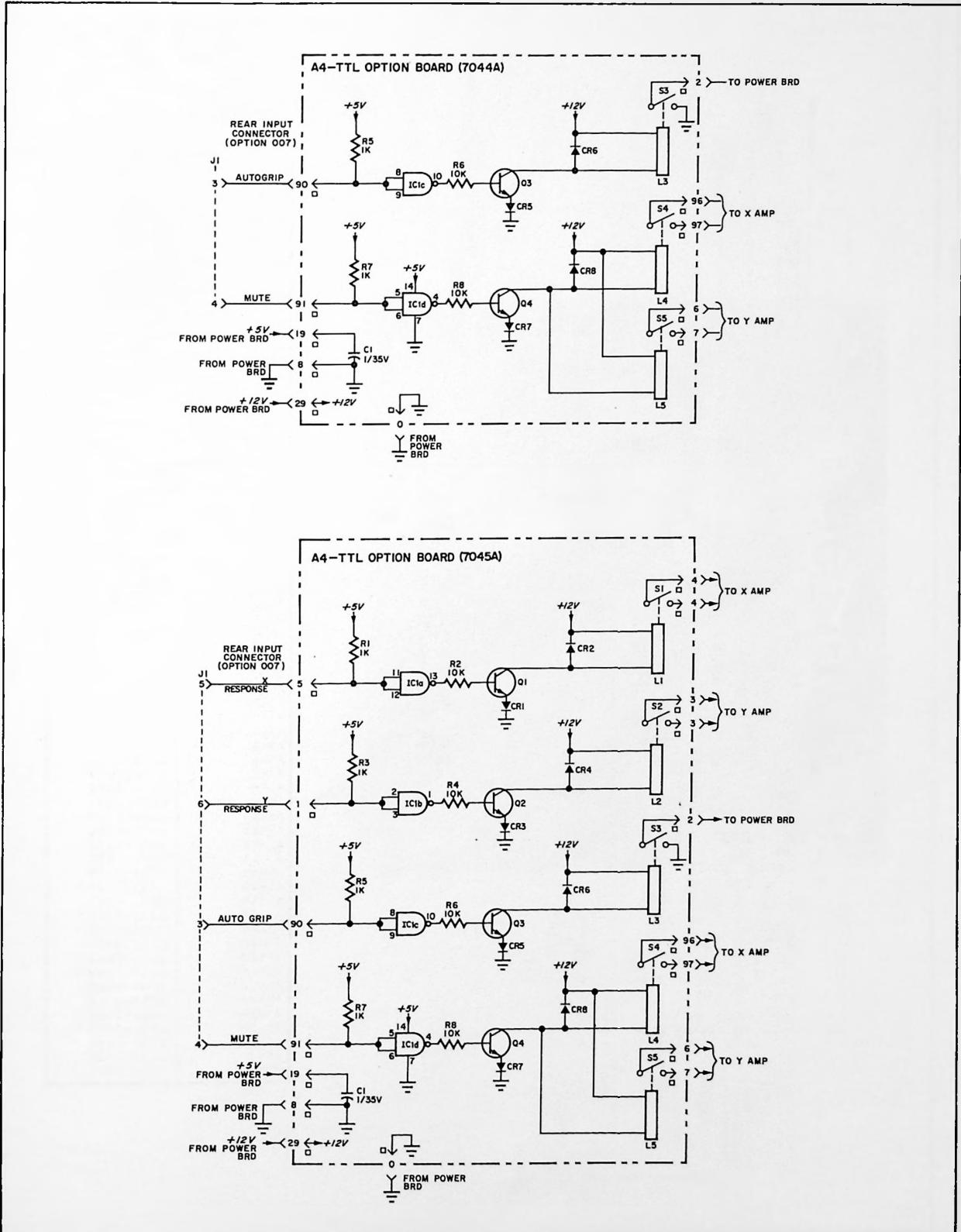
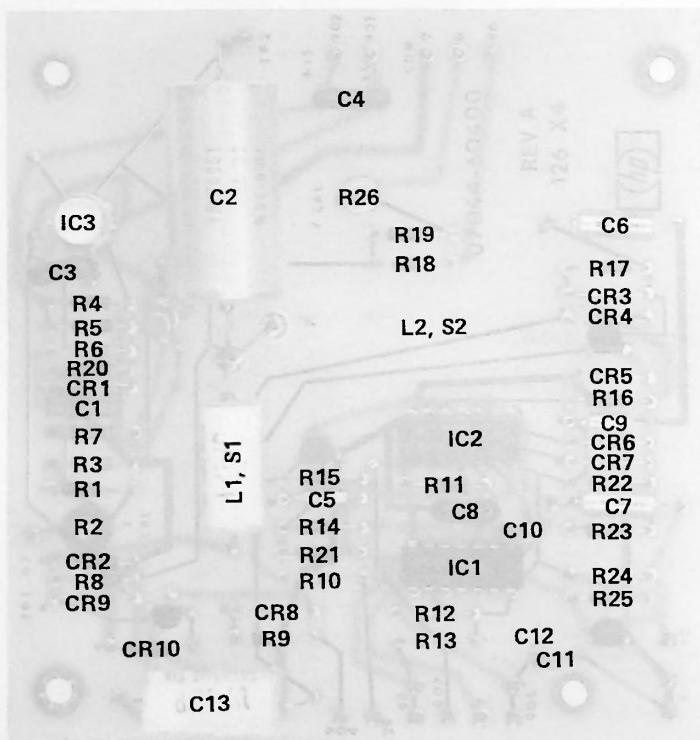


Figure 7-12. TTL Schematic



Reference Designation	HP Part Number
A5	07044-6040C
A5C1	0160-0174
A5C2	0160-3477
A5C3	0160-2208
A5C4	0150-0121
A5C5	0180-0291
A5C6	0180-1746
A5C7	0180-0374
A5C8	0160-2208
A5C9	0180-1743
A5C10	0150-0050
A5C11	0150-0093
A5C12	0150.0093
A5C13	0180-0039
A5CR1	1902-0786
A5CR2	1902-3139
A5CR3	1901-0040
A5CR4	1901-0040
A5CR5	1901-0040
A5CR6	1901-0040
A5CR7	1901-0040
A5CR8	1901-0040
A5CR9	1901-0040
A5CR10	1902-0048
A5IC1	1820-0328
A5IC2	1820-0054
A5IC3	1820-0223
A5L1	0490-0971
A5L2	0490-0971
A5O1	1855-0301
A5O2	1854-0071
A5O3	1854-0071
A5O4	1854-0071
A5O5	1853-0020
A5R1	0698-4424
A5R2	2100-3215
A5R3	0698-3442
A5R4	0698-3159
A5R5	0698-3158
A5R6	0698-3150
A5R7	0698-3449
A5R8	0698-3446
A5R9	0757-0290
A5R10	0698-3445
A5R11	0698-3441
A5R12	0698-3150
A5R13	0698-3150
A5R14	0757-0449
A5R15	0757-0430
A5R16	0757-0280
A5R17	0757-0280
A5R18	0757-0290
A5R19	0757-0200
A5R20	0698-0082
A5R21	0757-0458
A5R22	0698-3150
A5R23	0757-0428
A5R24	0698-3458
A5R25	0757-0438
A5R26	2100-1986
A5S1	0490-0778
A5S2	0490-0778

Figure 7-13. Time Base Circuit Board – Option 001

Figure 7-14. Time Base Schematic

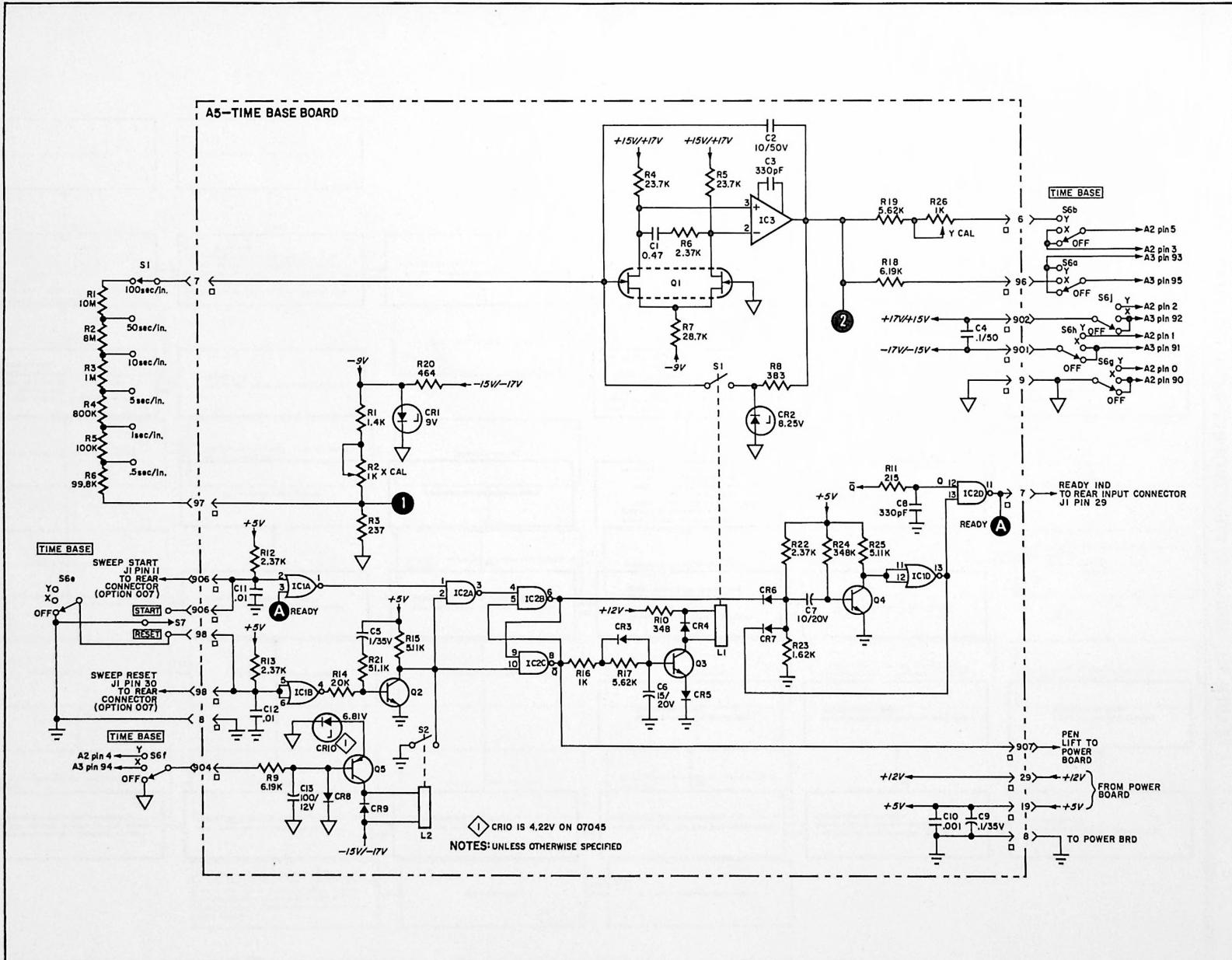


TABLE 7-1. SERVO SYSTEM TROUBLESHOOTING CHART

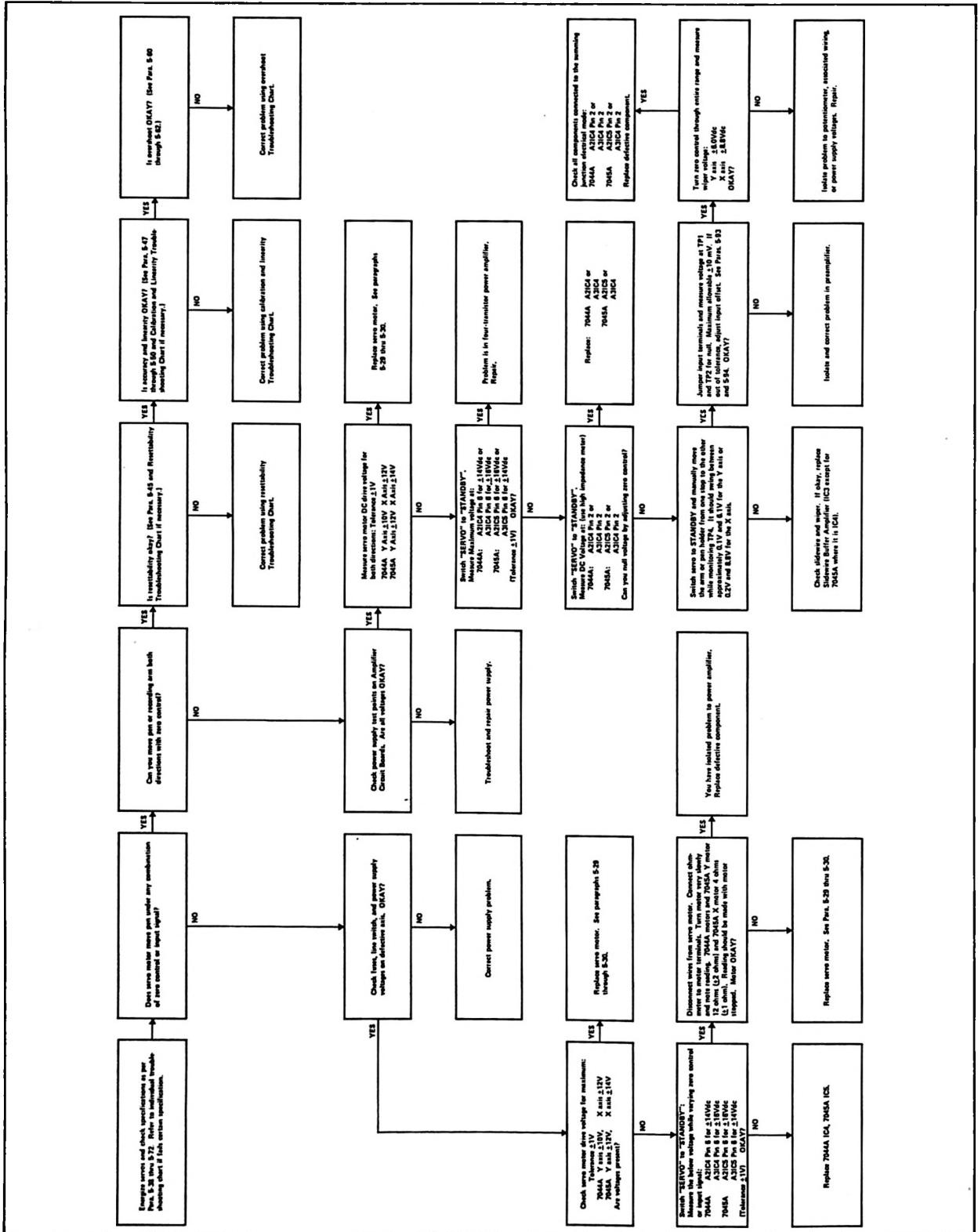


TABLE 7-2. RESETTABILITY TROUBLESHOOTING CHART

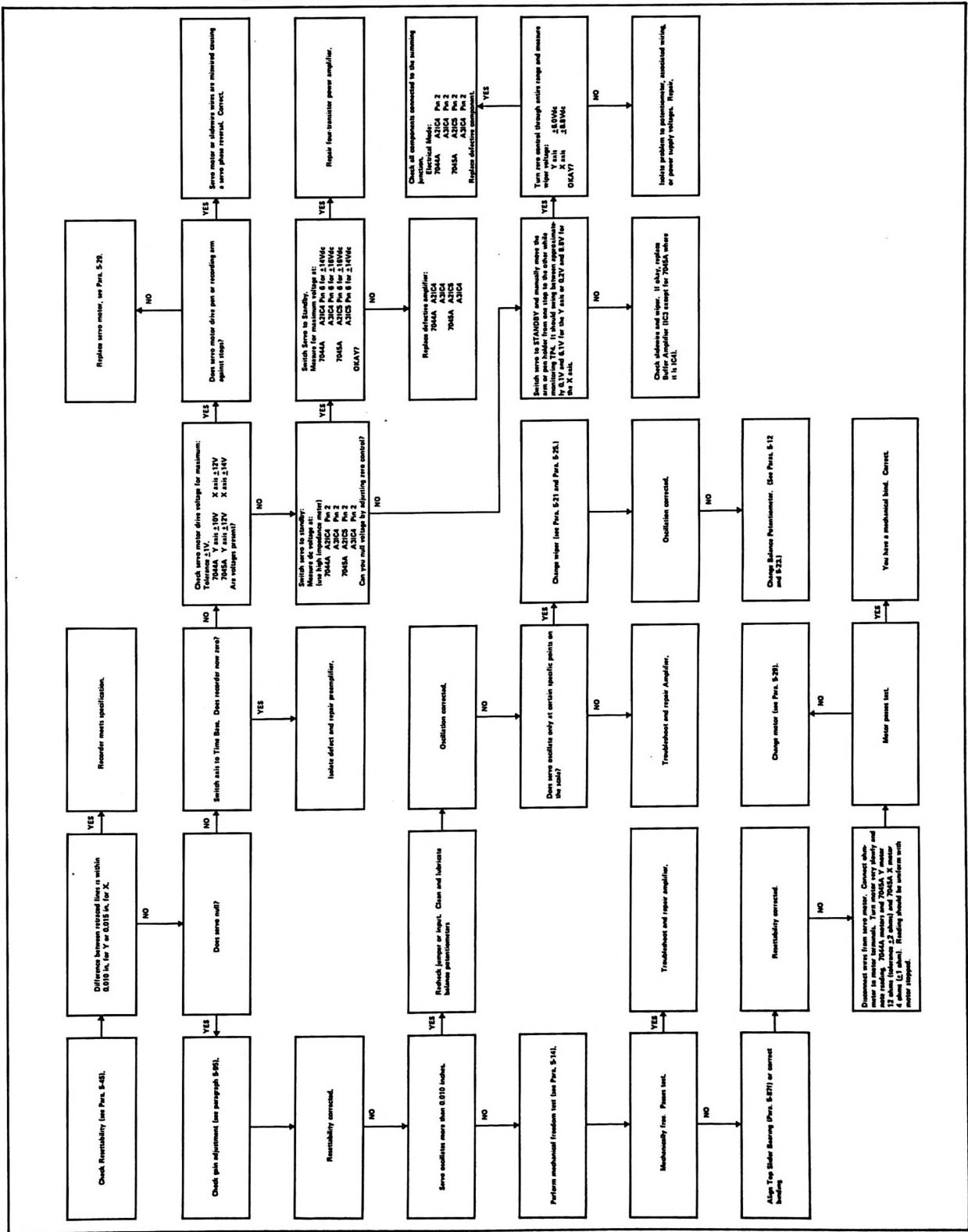


TABLE 7-3. CALIBRATION AND LINEARITY TROUBLESHOOTING CHART

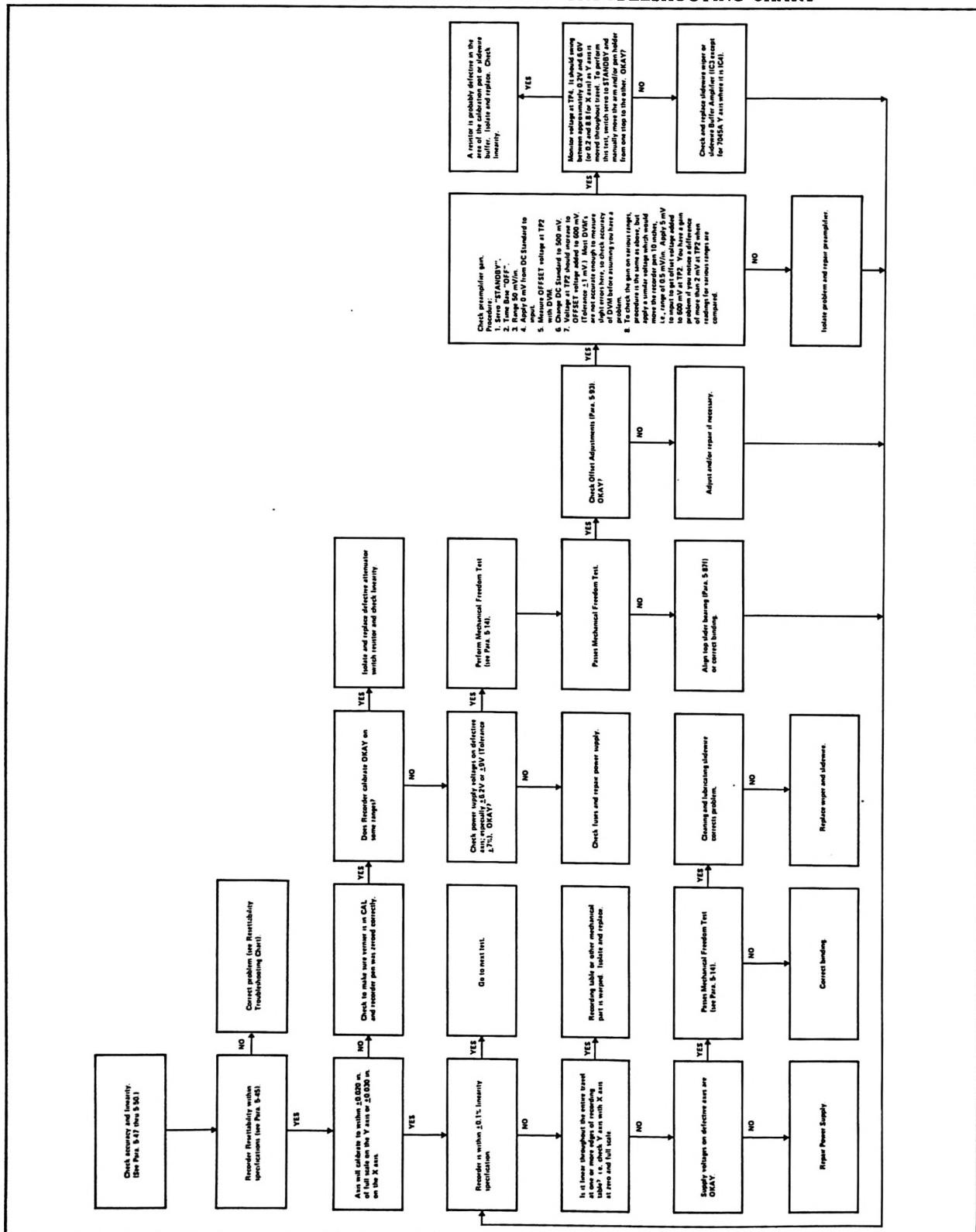


TABLE 7-4. INPUT RESISTANCE TROUBLESHOOTING CHART

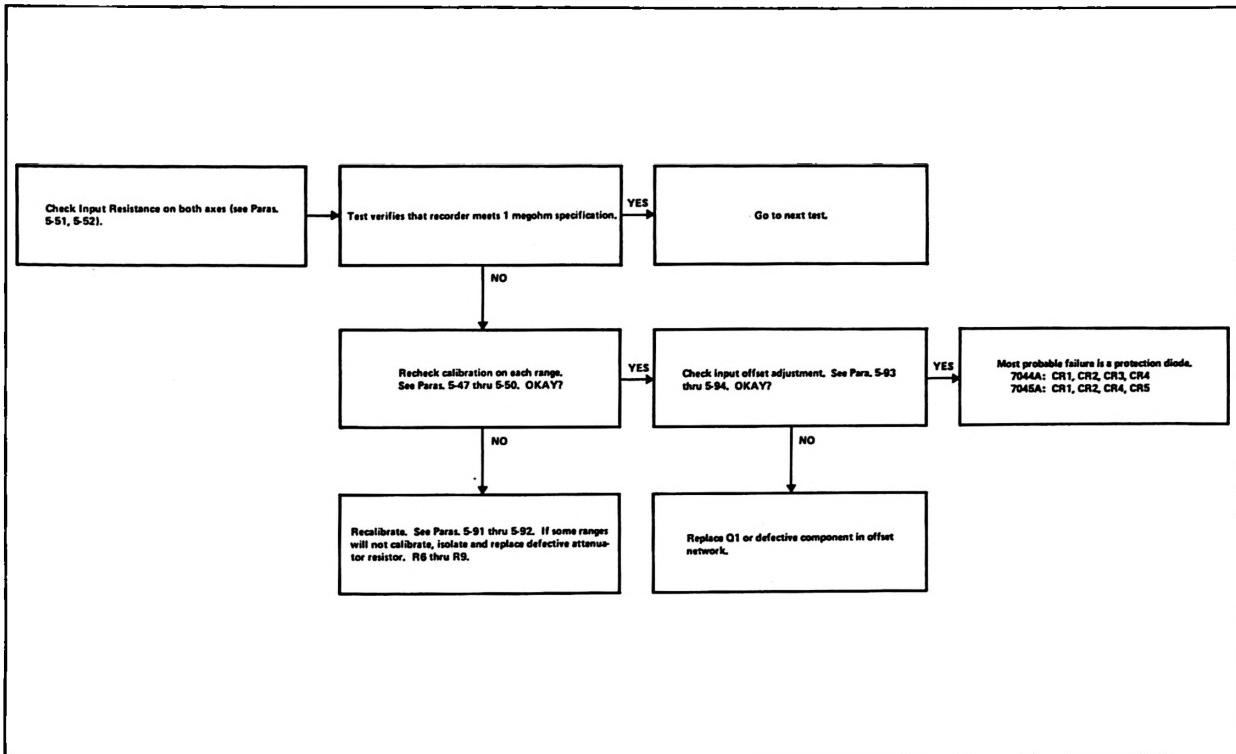


TABLE 7-5. SLEWING SPEED TROUBLESHOOTING CHART

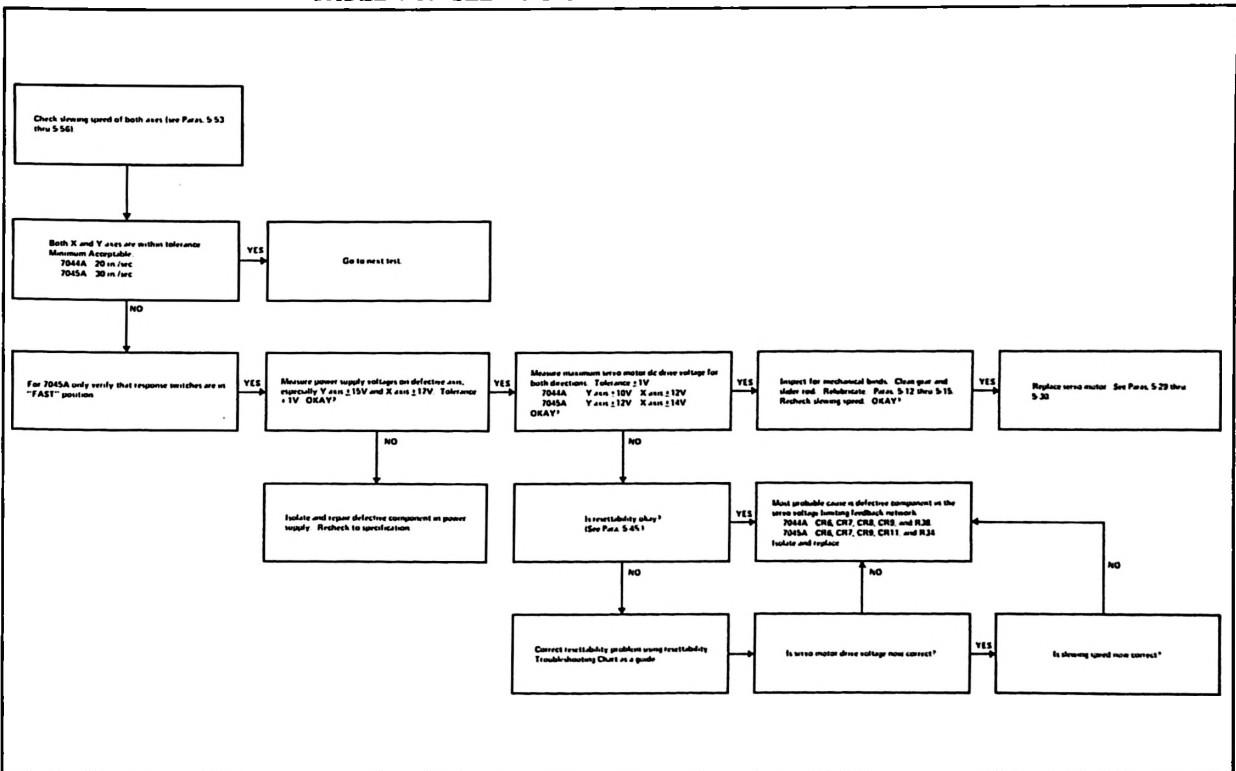


TABLE 7-6. AC/DC COMMON MODE REJECTION TROUBLESHOOTING CHART

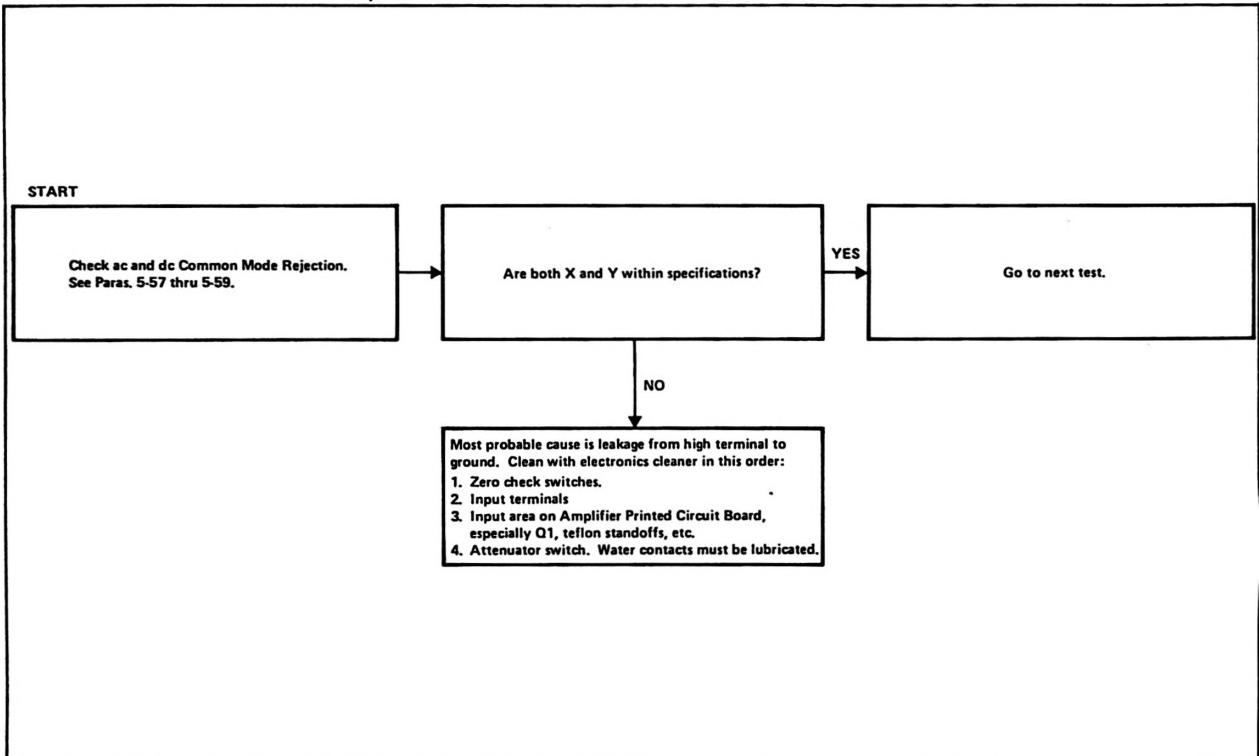
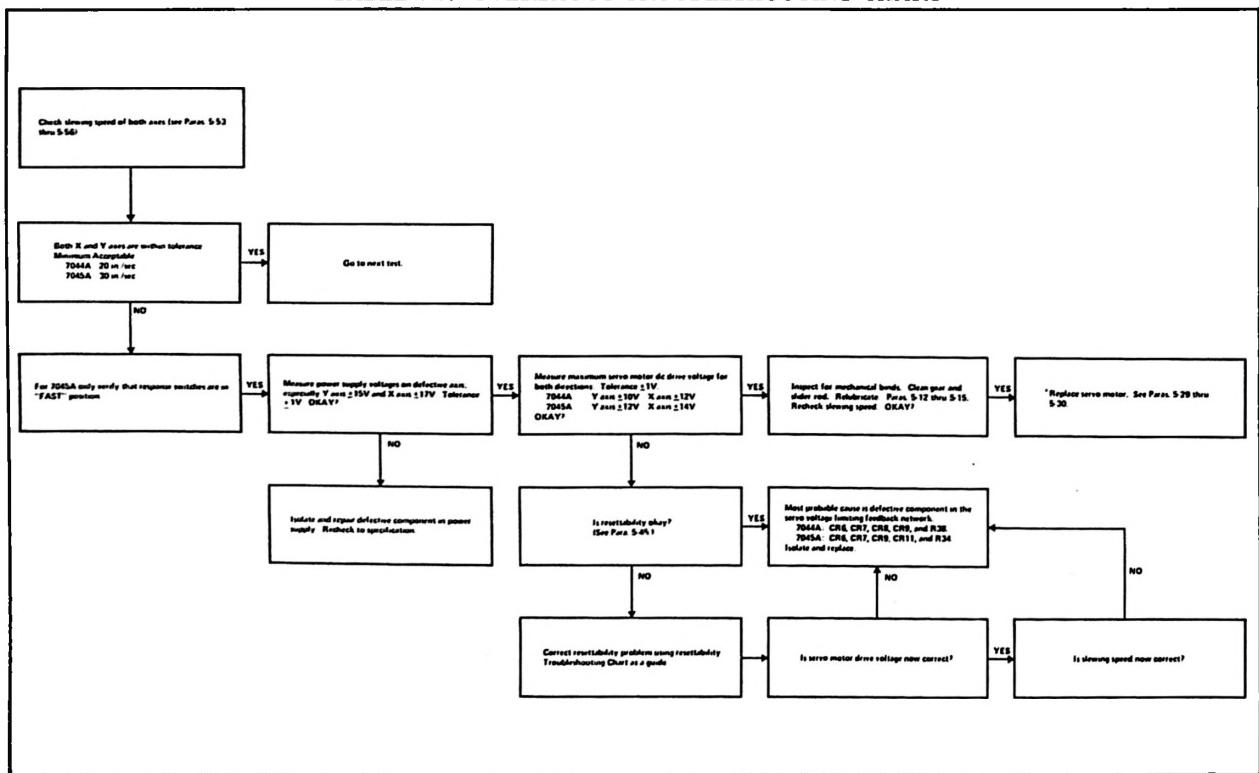


TABLE 7-7. OVERSHOOT TROUBLESHOOTING CHART





**HEWLETT** **PACKARD**

## SALES & SERVICE OFFICES

### UNITED STATES

#### ALABAMA

2290 Whitesburg Dr., S.E.  
P.O. Box 4207  
Huntsville 35802  
(205) 581-4591  
TWX: 910-226-2204  
Medical Only

226 W. Valley Ave.,  
Room 302

Birmingham 35209

Tel: (205) 879-2081/2

ARIZONA

2316 E. Magnolia St.  
Phoenix 85034  
Tel: (602) 244-1361  
TWX: 910-951-1331

2424 East Aragon Rd.

Tucson 85706

Tel: (602) 889-4661  
TWX: 710-465-2029

\*ARKANSAS

Medical Service Only

Little Rock 72205

Tel: (501) 664-8773

CALIFORNIA

1430 East Orangehorpe Ave.

Fulerton 92625

Tel: (714) 870-1000  
TWX: 910-592-1288

3039 Larkham Boulevard

North Hollywood 91604

Tel: (213) 877-1262

TWX: 910-499-2170

6305 Aragon Place

Los Angeles 90045

Tel: (213) 649-2511  
TWX: 910-328-6147

\*Los Angeles

Tel: (213) 776-5500

3003 Scott Boulevard

Santa Clara 95051

Tel: (408) 245-7200  
TWX: 910-338-0518

\*Ridgecrest

Tel: (714) 446-6165

2220 Watt Ave.

Sacramento 95825

Tel: (916) 482-1463  
TWX: 910-367-2092

#### COLORADO

5600 South Ulster Parkway  
Englewood 80110

Tel: (303) 771-3445  
TWX: 910-935-0705

CONNECTICUT

12 Lark Street

New Haven 06525

Tel: (203) 389-6551  
TWX: 710-465-2029

FLORIDA

2806 W. Oakland Park Blvd.

Ft. Lauderdale 33307

Tel: (305) 731-2020  
TWX: 510-955-4099

JACKSONVILLE

Medical Service only

Tel: (904) 721-6201  
TWX: 810-955-5524

KENTUCKY

P.O. Box 9110

Orlando 32809

Tel: (305) 859-2900  
TWX: 810-850-0113

Louisiana

P.O. Box 840

3239 Williams Boulevard

Kenner 70062

Tel: (504) 712-6201  
TWX: 810-955-5524

MARYLAND

6701 Woodlawn Road

Baltimore 21201

Tel: (301) 944-5400  
TWX: 710-852-9157

MISSISSIPPI

4 Choke Cherry Road

Rockville 20850

Tel: (301) 948-6370  
TWX: 710-828-9685

MISSOURI

1131 Colorado Ave.

Kansas City 64137

Tel: (816) 221-3000  
TWX: 510-771-2087

MISSOURI

148 Winton Parkway

Maryland Heights 63043

Tel: (314) 567-1455  
TWX: 810-764-0830

MISSOURI

Medical/Calculator Only

Tel: (314) 921-0300  
TWX: 810-221-1201

MISSOURI

8456 East Malley Road

Syracuse 13211

Tel: (315) 455-2486  
TWX: 710-541-0482

MISSOURI

1 Crossways Park West

Woodbury 11739

Tel: (516) 921-0300  
TWX: 510-221-2168

MISSOURI

1923 North Main Street

Tel: (314) 244-5448  
TWX: 810-762-1516

MISSOURI

High Point 27262

Tel: (919) 845-8101  
TWX: 810-221-1270

MISSOURI

201 E. Arizona Rd.

Richardson 75090

Tel: (214) 231-1010  
TWX: 910-867-4723

MISSOURI

275 Hymus Blvd.

Tel: (718) 221-2224

MISSOURI

Memphis

Medical Service only

Tel: (901) 247-7472

MISSOURI

Nashville

Medical Service only

Tel: (615) 244-5448  
TWX: 810-423-9431

MISSOURI

\*Service Only

FOR U.S. AREAS NOT LISTED:  
Contact the regional offices:  
nearest you: Atlanta, Georgia  
North Hollywood, California  
Rockville, (4 Choke Cherry Rd.)  
Maryland, Skokie, Illinois  
Other complete addresses  
are listed above

FOR CANADIAN AREAS NOT LISTED:  
Contact Hewlett-Packard (Canada)  
Ltd. in Mississauga

#### ILLINOIS

5500 Howard Street

Skokie 60076

Tel: (312) 677-0400  
TWX: 910-223-3613

Calculators Only

Tel: (312) 677-0400  
TWX: 910-223-3613

\*St. Joseph

Tel: (312) 469-2133  
TWX: 810-223-3613

INDIANA

7301 North Shadeland Ave.

Indianapolis 46250

Tel: (317) 842-1000  
TWX: 810-260-1796

CALIFORNIA

5600 South Ulster Parkway

Englewood 80110

Tel: (303) 771-3445  
TWX: 910-935-0705

CONNECTICUT

12 Lark Street

New Haven 06525

Night: (319) 338-9467  
TWX: 810-955-2137

KANSAS

Derby

Tel: (316) 267-3655  
TWX: 810-221-1201

LOUISIANA

P.O. Box 840

3239 Williams Boulevard

Kenner 70062

Tel: (504) 702-6201  
TWX: 810-955-2137

MARYLAND

6701 Woodlawn Road

Baltimore 21201

Tel: (301) 944-5400  
TWX: 710-852-9157

MISSOURI

4 Choke Cherry Road

Rockville 20850

Tel: (301) 948-6370  
TWX: 710-828-9685

MISSOURI

P.O. Box 1648

2 Choke Cherry Road

Fairfax 22050

Tel: (703) 256-6262  
TWX: 703-256-6262

MISSOURI

11300 Lomas Blvd. N.E.

Albuquerque 87123

Tel: (505) 292-1310  
TWX: 910-989-1185

MISSOURI

11300 Lomas Blvd. N.E.

Albuquerque 87123

Tel: (505) 292-1310  
TWX: 910-989-1185

MISSOURI

1630 Sprague Road

Edgewood 21200

Tel: (216) 243-7300  
TWX: 910-867-4723

MISSOURI

201 E. Arizona Rd.

Richardson 75090

Tel: (214) 231-1010  
TWX: 910-867-4723

MISSOURI

275 Hymus Blvd.

Tel: (718) 221-2224  
TWX: 910-867-4723

MISSOURI

Memphis

Medical Only

Tel: (615) 244-5448  
TWX: 810-762-1516

MISSOURI

275 Hymus Blvd.

Tel: (718) 221-2224  
TWX: 910-867-4723

MISSOURI

Memphis

Medical Only

Tel: (615) 244-5448  
TWX: 810-762-1516

MISSOURI

Memphis

Medical Only

Tel: (615) 244-5448  
TWX: 810-762-1516

MISSOURI

Memphis

Medical Only

Tel: (615) 244-5448  
TWX: 810-762-1516

MISSOURI

Memphis

Medical Only

Tel: (615) 244-5448  
TWX: 810-762-1516

MISSOURI

Memphis

Medical Only

Tel: (615) 244-5448  
TWX: 810-762-1516

MISSOURI

Memphis

Medical Only

Tel: (615) 244-5448  
TWX: 810-762-1516

MISSOURI

Memphis

Medical Only

Tel: (615) 244-5448  
TWX: 810-762-1516

MISSOURI

Memphis

Medical Only

Tel: (615) 244-5448  
TWX: 810-762-1516

MISSOURI

Memphis

Medical Only

Tel: (615) 244-5448  
TWX: 810-762-1516

MISSOURI

Memphis

Medical Only

Tel: (615) 244-5448  
TWX: 810-762-1516

MISSOURI

Memphis

Medical Only

Tel: (615) 244-5448  
TWX: 810-762-1516

MISSOURI

Memphis

Medical Only

Tel: (615) 244-5448  
TWX: 810-762-1516

MISSOURI

Memphis

Medical Only

Tel: (615) 244-5448  
TWX: 810-762-1516

MISSOURI

Memphis

Medical Only

Tel: (615) 244-5448  
TWX: 810-762-1516

MISSOURI

Memphis

Medical Only

Tel: (615) 244-5448  
TWX: 810-762-1516

MISSOURI

Memphis

Medical Only

Tel: (615) 244-5448  
TWX: 810-762-1516

MISSOURI

Memphis

Medical Only

Tel: (615) 244-5448  
TWX: 810-762-1516

MISSOURI

Memphis

Medical Only

Tel: (615) 244-5448  
TWX: 810-762-1516

MISSOURI

Memphis

Medical Only

Tel: (615) 244-5448  
TWX: 810-762-1516

MISSOURI

Memphis

Medical Only

Tel: (615) 244-5448  
TWX: 810-762-1516

MISSOURI

Memphis

Medical Only

Tel: (615) 24

## EUROPE

**AUSTRIA**  
Hewlett-Packard Ges mb H  
Hundstorf 52/3  
P.O. Box 7  
A-1205 Vienna

Tel: (0222) 35 16 20 to 29

Cable HEWPACK Vienna

Tel: 75923 hepia a

**BELGIUM**

Hewlett-Packard Benelux

A. A. Vlaams

Avenue de Col-Vert, 1.

(Greenlaan),

B-1170 Brussels

Tel: (02) 672 22 40

Cable PALOBEN Brussels

Tel: 23 494 palben bru

**DENMARK**

Hewlett-Packard A/S

Damsgaard 52

DK-3460 Birkerød

Tel: (02) 61 66 40

Cable HEWPACK AS

Tel: 166 40 hpas

Hewlett-Packard A/S

DK-8600 Silkeborg

Tel: (06) 82 71 66

Tel: 166 40 hp as

Cable HEWPACK AS

**FINLAND**

Hewlett-Packard Oy

Nakkahausut 5

S-00211 Helsinki 21

Tel: 692301

Cable HEWPACKY Helsinki

Tel: 12-15363

**FRANCE**

Hewlett-Packard France

Quai de Courtalain

Bat. Poste No 6

75191 Paris

Tel: (11) 907 78 25

Cable HEWPACK Orsay

Tel: 60048

Hewlett-Packard France

Agence Régionale

Chambre des Moulins

Chambre des Moulins No 12

F-69130 Ecully

Tel: (71) 33 81 25

Cable HEWPACK Ecully

Tel: 31 617

Hewlett-Packard France

Agence Régionale

Av. André Malraux

Avenue Clément Ader

F-31770 Colomiers

Tel: (61) 78 11 55

Tel: 51957

**Hewlett-Packard France**  
Agence Régionale  
Centre d'Action générale  
F-13721 Aéroport de  
Marignane

Hewlett-Packard France  
Agence Régionale  
31, Avenue de Rochester  
F-35000 Rennes

Tel: 749 12 F

Tel: 74 912 F

Hewlett-Packard France

Agence Régionale

Centre d'Action

201, rue Colbert

Entrep A

F-59000 Lille

Tel: (03) 18 90 86

Tel: 18 34 05 hpbin d

**GERMAN FEDERAL REPUBLIC**

Hewlett-Packard GmbH

Vertriebszentrale Frankfurt

Bernhardstrasse 117

Postfach 140

D-6000 Frankfurt 56

Tel: (0611) 50 04-1

Cable HEWPACKSA Frankfurt

Tel: 41 32 49 ra

Hewlett-Packard GmbH

Technisches Büro Böblingen

Hans-Böckler-Strasse 130

D-7030 Böblingen

Württemberg

Tel: (0711) 667-1

Cable HEPAK Böblingen

Tel: 0725733 bbb

Hewlett-Packard GmbH

Technisches Büro Düsseldorf

D-4000 Düsseldorf

West Germany

Tel: (0211) 63 80 31/5

Tel: 85 16 333 hdd p

Hewlett-Packard GmbH

Technisches Büro Hamburg

Wendenschl. 23

D-2000 Hamburg 1

Tel: (040) 24 13 93

Cable HEWPACKSA Hamburg

Tel: 21 63 032 hpph d

Cable HEPAK Hamburg

Tel: 21 63 032 hpph d

**GREECE**

Kostas Karavannis

18, Ermos Street

GR-Athens 176

Tel: 3200-205 Adm. Order Proc

Cable RAKAR Athens

Tel: 21 59 12 gr gr

Hewlett-Packard S.A.

Mediterranean & Middle East

Operators

53 Kifissias Street

Plaka Kifissias

Gr-Kifissia-Athens

Tel: 011-98 62 48

Cable HEWPACKSA Athens

Tel: 011-98 62 48

**ITALY**

Kostas Karavannis

18, Ermos Street

GR-Athens 176

Tel: 3200-205 Adm. Order Proc

Cable RAKAR Athens

Tel: 21 59 12 gr gr

Hewlett-Packard S.p.A.

Mediterraneo d'Oro, 2

I-56100 Pisa

Tel: (050) 32 32 04

Cable INTERTELE MILAN

Tel: 050 32 32 04

Hewlett-Packard S.p.A.

Medice S.p.A.

Via Piero Maroncelli 40

Ita 10000 Genova

Tel: 010-52 32 55

Cable HEPAK Genova

Tel: 010-52 32 55

**IRELAND**

Hewlett-Packard Ltd.

Technisches Büro Hannover

Melscheder Strasse 3

D-3000 Hannover 1

Tel: (0511) 53 32 55

Tel: 051 32 32 55

Cable HEPAK Hannover

Tel: 051 32 32 55

**NETHERLANDS**

Hewlett-Packard Benelux N.V.

P.O. Box 567

NL-1180 Stadhouderskade

Tel: (02) 47 20 21

Cable PALOBEN Amsterdam

Tel: 13 216 hepa nl

**NORWAY**

Hewlett-Packard Norge A/S

Nesveien 13

No 1-3, Oslo 1

Tel: 25 38 350

Tel: 16521 hpnas n

**SWEDEN**

Hewlett-Packard Sverige AB

Enighetsvägen 1-3

SE-161 20 Bromma

Tel: (08) 50 05 50

Cable MEASUREMENTS

Stockholm

Tel: 08 10 21

**SWEDEN**

Hewlett-Packard Sverige AB

E-Blåvita

SE-160 42 Kista

Tel: 60 42 00

**SWEDEN**

Hewlett-Packard Sverige AB

E-Blåvita

SE-160 42 Kista

Tel: 60 42 00

**SWEDEN**

Hewlett-Packard Sverige AB

E-Blåvita

SE-160 42 Kista

Tel: 60 42 00

**SWEDEN**

Hewlett-Packard Sverige AB

E-Blåvita

SE-160 42 Kista

Tel: 60 42 00

**SWEDEN**

Hewlett-Packard Sverige AB

E-Blåvita

SE-160 42 Kista

Tel: 60 42 00

**SWEDEN**

Hewlett-Packard Sverige AB

E-Blåvita

SE-160 42 Kista

Tel: 60 42 00

**SWEDEN**

Hewlett-Packard Sverige AB

E-Blåvita

SE-160 42 Kista

Tel: 60 42 00

**SWEDEN**

Hewlett-Packard Sverige AB

E-Blåvita

SE-160 42 Kista

Tel: 60 42 00

**SWEDEN**

Hewlett-Packard Sverige AB

E-Blåvita

SE-160 42 Kista

Tel: 60 42 00

**SWEDEN**

Hewlett-Packard Sverige AB

E-Blåvita

SE-160 42 Kista

Tel: 60 42 00

**SWEDEN**

Hewlett-Packard Sverige AB

E-Blåvita

SE-160 42 Kista

Tel: 60 42 00

**SWEDEN**

Hewlett-Packard Sverige AB

E-Blåvita

SE-160 42 Kista

Tel: 60 42 00

**SWEDEN**

Hewlett-Packard Sverige AB

E-Blåvita

SE-160 42 Kista

Tel: 60 42 00

**SWEDEN**

Hewlett-Packard Sverige AB

E-Blåvita

SE-160 42 Kista

Tel: 60 42 00

**SWEDEN**

Hewlett-Packard Sverige AB

E-Blåvita

SE-160 42 Kista

Tel: 60 42 00

**SWEDEN**

Hewlett-Packard Sverige AB

E-Blåvita

SE-160 42 Kista

Tel: 60 42 00

**SWEDEN**

Hewlett-Packard Sverige AB

E-Blåvita

SE-160 42 Kista

Tel: 60 42 00

**SWEDEN**

Hewlett-Packard Sverige AB

E-Blåvita

SE-160 42 Kista

Tel: 60 42 00

**SWEDEN**

Hewlett-Packard Sverige AB

E-Blåvita

SE-160 42 Kista

Tel: 60 42 00

**SWEDEN**

Hewlett-Packard Sverige AB

E-Blåvita

SE-160 42 Kista

Tel: 60 42 00

**SWEDEN**

Hewlett-Packard Sverige AB

E-Blåvita

SE-160 42 Kista

Tel: 60 42 00

**SWEDEN**

Hewlett-Packard Sverige AB

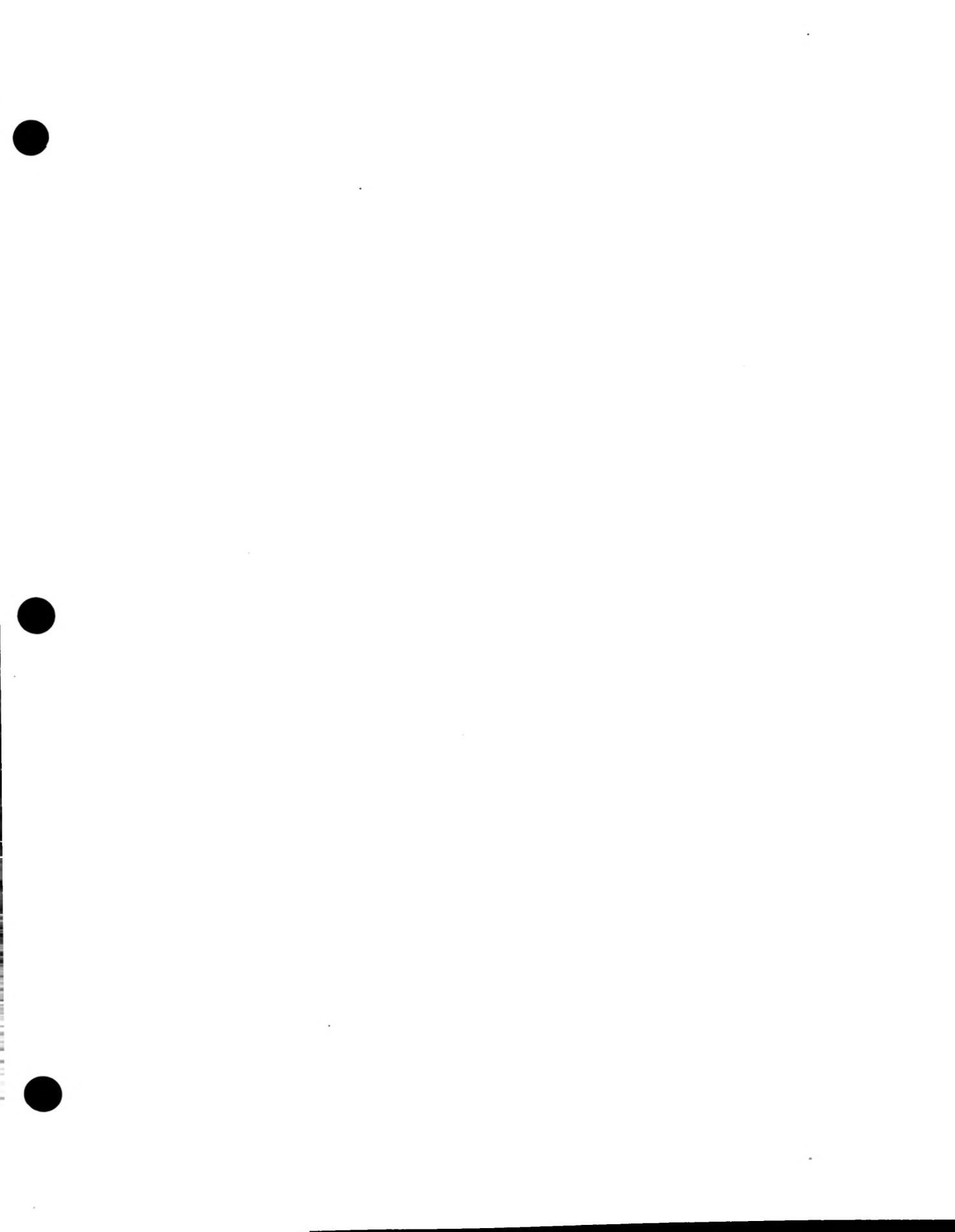
E-Blåvita

SE-160 42 Kista

Tel: 60 42 00

**SWEDEN**

Hewlett-Packard Sverige AB



MAGNETIC ANALYSIS CORP.  
23995 Freeway Park Dr.  
Farmington, Mich. 48024  
313-478-0020  
~~313-478-0020~~

HEWLETT  PACKARD

## HP MANUAL CHANGES

Make all corrections in your manual according to errata.  
Check the following table for your instrument serial prefix  
and make indicated changes in the manual.

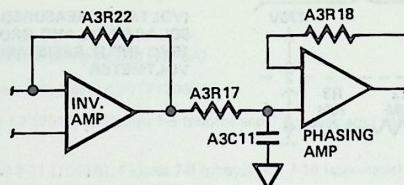
\*New Item

SERIAL PREFIX	MAKE CHANGE	SERIAL PREFIX	MAKE CHANGE	SERIAL PREFIX	MAKE CHANGE
1233A	I	1340A (7045A)	I thru V	1428 (7044A)	I thru X
1249A (7044A)	I, II	1346A (7044A)	I thru VI	1541	I thru XI
1249A (7045A)	I, II	1347A (7044A)	I thru VII	1605 (7044A)	I thru XII
1323A	I, II, III	1414 (7044A/45A)	I thru VIII	1614 (7044A/45A)	I thru XIII
1339A (7045A)	I, II, III, IV	1427 (7044A/45A)	I thru IX		

### ERRATA

Page 2-2, delete paragraphs 2-23 and 2-24.

Page 4-1, Figure 4-1, make the following change:



Page 5-1, paragraph 5-9, delete paragraphs 5-9d.1. through d.7. and replace with the following:

1. Remove the pen and paper from the recorder.
2. Carefully prepare a mixture of 50% isopropyl alcohol (HP Part No. 1535-1432) and 50% water.
3. Be careful in selecting a cleaning cloth. Use a soft cloth, or Kimwipe (Kimberly Clark, HP Part No. 9300-0001) that will not scratch the surface.
4. Apply the alcohol-water mixture to the cloth or Kimwipe.
5. Wipe the table surface until the AUTOGRIP table is clean.

### CAUTION

Never let solvent stand on AUTOGRIP surface.  
It may permanently damage the table.

6. Wipe any moisture from the surface.
7. Allow to dry before recording.

Page 5-10, delete paragraphs 5-45 and 5-46 and substitute the following:

#### 5-45. RETRACE.

- 5-46. To perform the retrace check, install the disposable pen and chart paper.  
Set the controls:

Chart Switch — HOLD  
Power Switch — ON  
Servo Switch — ON

Make connections as shown in Figure 5-11A. Set the controls of the HP 3310A as follows:

Power — ON  
Frequency — 0.071 Hz for 7044A; 0.35 Hz for 7045A  
Waveform — Triangular wave

- a. To make a 45 degree angle retrace check, proceed as follows:
  1. Set RANGE switches to 0.1 V/in. (0.05 V/cm).
  2. Gradually increase amplitude of HP 3310A until both axes have a travel of seven inches, centered approximately around midscale.

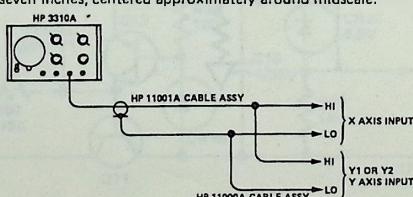


Figure 5-11A. Retrace Test Setup

MANUAL TITLE: 7044A/7045A X-Y RECORDER

MANUAL PRINTED: MAY 1972

MANUAL PART NO: 07044-90000

CHANGE DATE: FEBRUARY 13, 1976

3. Drop the pen. The recorder should draw a line at approximately a 45 degree angle and about ten inches long.

4. Allow the pen to draw a single line, then retrace this line once.

5. The width of the retraced line should be no greater than 0.010 inches (0.25 mm) plus the width of the single pen line. If retrace width is greater, check mechanical freedom and X and Y amplifier gain.

b. To make a 75 degree angle retrace check, proceed as follows:

1. Set X-RANGE switch to 0.5 V/in. (0.25 C/cm) and Y-RANGE switch to 0.1 V/in. (0.05 V/cm). Set the Function Generator to 0.071 Hz triangular wave.

2. Drop the pen. The recorder should draw a line at approximately a 75 degree angle, about seven inches in the Y-direction.

3. Allow the pen to draw a single line, then retrace this line once.

4. The width of the retraced line should be no greater than 0.015 inches (0.38 mm) plus the width of the single pen line. If retrace width is greater, check mechanical freedom and Y-axis amplifier gain.

c. To make a 15 degree angle retrace check, proceed as follows:

1. Set Y-RANGE switch to 0.5 V/in. (0.25 V/cm) and X-RANGE switch to 0.1 V/in. (0.05 V/cm). Set the Function Generator to 0.05 Hz triangular wave.

2. Drop the pen. The recorder should draw a line at approximately a 15 degree angle and about 10 inches in the X direction.

3. Allow the pen to draw a single line, then retrace this one once.

4. The width of the retraced line should be no greater than 0.015 inches (0.38 mm) plus the width of the single pen line. If retrace width is greater, check mechanical freedom and X-axis amplifier gain.

Page 5-12, paragraphs 5-58 and 5-59, step e, change to read:

- Pen deflection shall not exceed 3.2 in. (6.4 cm) with pen at any position on paper.
- Pen deflection shall not exceed 1.9 in. (3.8 cm) with pen at any position on paper.

Page 5-17, paragraph 5-94, step b, should read:

- Connect jumper between HI and LO input terminals of both axes. Position range switches on X and Y to 0.5 mV/in. (0.25 mV/cm). Position Time Base switch to OFF.

Page 6-5 (7044A) and 6-23 (7045A), Figures 6-1 and 6-3, add to Item 10:

1251-3122 Connector Pin Hewlett-Packard

Page 6-6, Figure 6-1, Sheet 5, add Item 103 near Item 45.

Page 6-7, Figure 6-1, Item 29, part number is 0905-0442.

Page 6-7, Figure 6-1, Item 53, change Part No. to 07041-60001.

Page 6-8, Figure 6-1, Item 74, change to:

74 07040-60810 Drive Gear Assembly Hewlett-Packard

(Make same change on Page 6-26, Figure 6-3, Item 74.)

Page 6-8, Figure 6-1, Sheet 7, add Item 103:

103 1410-0269 Ball Bearing Hewlett-Packard

7044A/7045A X-Y Recorder  
Page 2

Pages 6-14 (7044A) and 6-32 (7045A), Tables 6-2 and 6-5, add:

ACCESSORY KIT – PART NO. 07040-60632 – EVENT MARKER

1530-1026	Ink Cartridge Red (77 cc)	3
2110-0312	Fuse, 1A, Slow Blow	1
5080-3605	Freon, Can	1
5080-3635	Slidewire Lubricant	1
5080-3655	Plastic Tip, Pen Assembly	1
5081-1190	Disposable Pen, Red	1
5081-1191	Disposable Pen, Blue	1

Page 6-15, Table 6-2, Mainframe Components, 2A Fuse should read:

2110-0303 F1 Fuse 2ASB (for 115V operation) Bussman Mfg. MDX-2A

Page 6-17, Table 6-3, Fuse, should read:

F1	2110-0303	Fuse, 2A (for 115 VAC)	10
F1	2110-0312	Fuse, 1A (for 230 VAC)	10

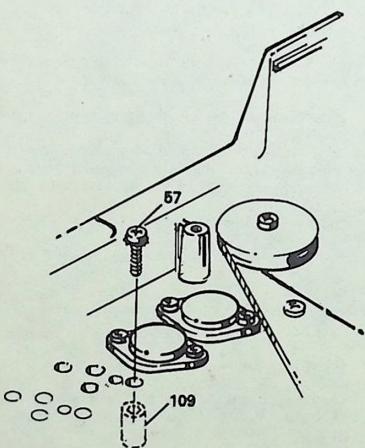
Page 6-19, Figure 6-2, change Items 30 and 32 to read:

30	07040-21050	Front Casting	Hewlett-Packard
32	07044-60520	Front Panel	Hewlett-Packard
	07044-60530	Front Panel – Opt. 001	Hewlett-Packard
	07044-60570	Front Panel – Opt. 001 & 006	Hewlett-Packard
	07044-60600	Front Panel – Opt. 006	Hewlett-Packard

Page 6-20/6-21, Figure 6-3 (Sheet 1 and 2 of 7), add both side trim panels, screws (4) and washers (4) to illustration, also add to parts list:

37	07040-00417	R. H. Side Trim	Hewlett-Packard
38	07040-00416	L. H. Side Trim	Hewlett-Packard
39	2190-0303	Washer, Fiber	Empire
40	2510-0020	Screw, Pozidriv, 8-32 x 3/8	Indiana Metal Prod.

Page 6-24, Figure 6-3, add standoff (109) and screw (57) to illustration as shown:



Page 6-24, Figure 6-3, Sheet 5, add Item 110 near Item 45.

Page 6-25, Figure 6-3, Item 29, part number is 0905-0442.

Page 6-25, Figure 6-3, Item 53, change part no. to 07041-60001.

Page 6-26, Figure 6-3, add Item 109:

109	07041-20020	Standoff	Hewlett-Packard
-----	-------------	----------	-----------------

Page 6-26, Figure 6-3, Sheet 7, add Item 110:

110	1410-0269	Ball Bearing	Hewlett-Packard
-----	-----------	--------------	-----------------

Page 6-26, change Item 91 to read as follows:

91	2360-0085	Screw, Mach, 6-32 x 5/8	Central Screw
----	-----------	-------------------------	---------------

Page 6-33, Table 6-5, Mainframe Components, change 2A fuse to:

2110-0303 F1 Fuse 2A SB (115V operation) Bussman Mfg. MDX-2A

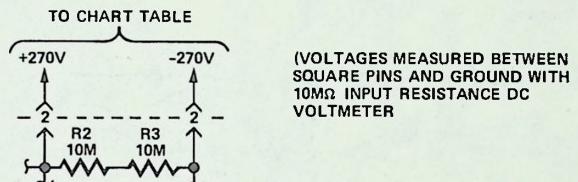
Page 6-35, Table 6-6, Fuse should read:

F1	2110-0303	Fuse, 2A (for 115 Vac)	10
F1	2110-0312	Fuse, 2A (for 230 Vac)	10

Page 6-37, Figure 6-4, change Item 30 and add Item 32 to read:

30	07040-21050	Front Casting	Hewlett-Packard
32	07045-60010	Control Panel	Hewlett-Packard
	07045-60020	Control Panel – Opt. 001	Hewlett-Packard
	07045-60030	Control Panel – Opt. 001 & 006	Hewlett-Packard
	07045-60040	Control Panel – Opt. 006	Hewlett-Packard

Page 7-3, Figure 7-2, change schematic as shown:



Page 7-9, Figure 7-8, label resistor at IC4 R27 3.16K.

Page 7-11, Figure 7-10, values of R31 and R53 should be 121 and 237K, respectively.

Page 7-14, Figure 7-13, Photo, add callouts on transistors in the following order:

Q1	Q5	Q2	Q3
			Q4

Page 7-15, Figure 7-14, add to NOTES:

2 R24 is 464K on 7045

Add 2 next to R24 on schematic

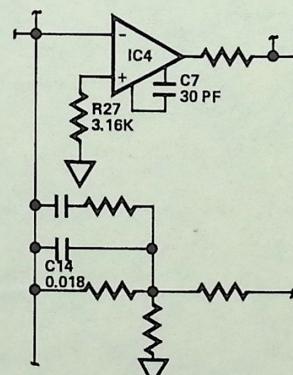
CHANGE I

Page 6-29, Table 6-4, change A3C7 and add A3C14 to read:

A3C7	0160-2199	1	C:Fxd Mica 30 pF 300V	28480	0160-2199
A3C14	0160-0302	1	C:Fxd MY 0.018μF 200V	56289	292P18392- PTS

Page 7-8, Figure 7-7, change A3C7, part no. to 0160-2199 and add A3C14 0160-0302.

Page 7-9, Figure 7-8, make the following changes to schematic:



CHANGE II (7044A/7045A)

Page 6-10 and 6-11, Table 6-1, change A2R3, A2R4, A3R3, and A3R4 to read:

A2R3				
A2R4	0698-6977	4	R:Fxd Flm 30K ohm .1% 1/8W	19701
A3R3				MF4 T-9
A3R4				

Page 6-19, Figure 6-2, Item 2 should read:

2 07046-40420 Insulator - Binding Post Hewlett-Packard

Page 7-4, Figure 7-3, A3R3 and A3R4 Part No. is 0698-6977.

Page 7-5, Figure 7-4, change values of A3R3, A3R4 to 30K.

Page 7-7, Figure 7-6, change values of A2R3, A2R4 to 30K.

CHANGE III

Page 6-9, Table 6-1, delete A2C16 (7045A).

Page 6-27, Table 6-4, delete A2C12 (7045A).

Pages 7-6 and 7-7 (7044A), Figures 7-5 (photo) and 7-6 (schematic) delete A2C16. Add Buss.

Pages 7-10 and 7-11 (7045A), Figures 7-9 (photo) and 7-10 (schematic) delete A2C12. Add Buss.

CHANGE IV (7045A)

Y-AMPLIFIER BOARD

Page 6-27, Table 6-4, add A2C22 and A2C23 and change A2CR17 and A2CR18 to:

A2C22, A2C23	0180-0291	C:Fxd Elec 1μF 10% 35 VDCW	56289	150D105X9035 A2-D-15
A2CR17, A2CR18	1902-3214	Diode: Breakdown: 16.2V 2%	28480	1902-3214

Page 6-28, Table 6-4, make the following changes:

Delete L1 and L2.

Add:

A2Q12	1854-0215	TSTR SI NPN	04713	SPS3611
A2Q13	1853-0036	TSTR SI PNP	80131	2N3906

Change:

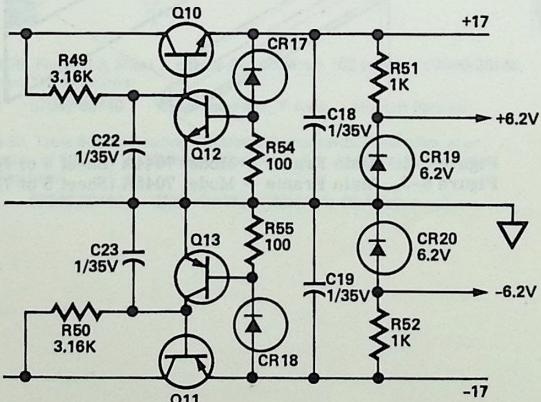
A2R49,50	0757-0279	R:Fxd Met Flm 3.16K ohm 1% 1/8W	28480	0757-0279
A2R51,52	0757-0280	R:Fxd Met Flm 1K ohm 1% 1/8W	28480	0757-0280

Add:

A2R54,55	0757-0401	R:Fxd Flm 100 ohm	19701	MF4C, T-O
----------	-----------	-------------------	-------	-----------

Page 7-10, Figure 7-9, appropriate changes from parts list apply to this list.

Page 7-11, Figure 7-10, Y-Axis, make changes to schematic as shown:



CHANGE V (7045A)

X-AMPLIFIER BOARD

Page 6-29, Table 6-4, add A3C20, A3C21, A3Q10, and A3Q11, change A3CR13, and A3CR14, and delete A3L1 and A3L2:

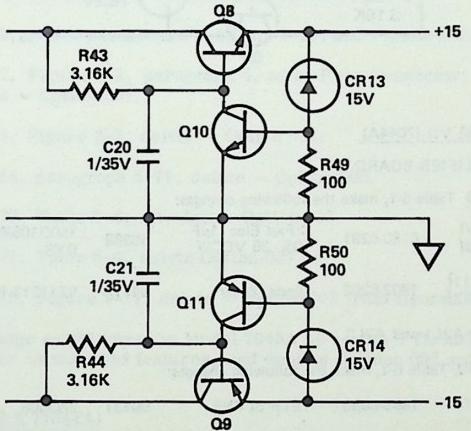
A3C20	0180-0291	C:fwd Elec 1μF 10% 35 VDCW	56289	150D106X9035 A2-D-15
A3C21	0180-0291	C:fwd Elec 1μF 10% 35 VDCW	56289	150D106X9035 A2-D-15
A3CR13	1902-0202	Diode, Zener	04713	SZ11213-191
A3CR14	1902-0202	Diode, Zener	04713	SZ11213-191
A3Q10	1854-0215	TSTR SI NPN	04713	SPS3611
A3Q11	1853-0036	TSTR SI PNP	80131	2N3906

Page 6-30, Table 6-4, change A3R43 and A3R44, add A3R49 thru A3R52:

A3R43	0757-0279	R:fwd met flm 3.16K ohm 1% 1/8W	28480	0757-0279
A3R44	0757-0279	R:fwd met flm 3.16K ohm 1% 1/8W	28480	0757-0279
A3R49	0757-0401	R:fwd flm 100 ohm	19701	MF4C T-O
A3R50	0757-0401	R:fwd flm 100 ohm	19701	MF4C T-O

Page 7-8, Figure 7-7, make appropriate changes from Parts List to this list.

Page 7-9, Figure 7-8, X-Axis, make changes to schematic as shown:



CHANGE VI (7044A)

X AMPLIFIER BOARD

\* Page 6-10, Table 6-1, make the following changes:

A3C16	0180-0291	C:Fxd Elec 1μF 10% 35 VDCW	56289	150D105X9035 A2DYS
A3CR11	1902-3214	Diode, 16.2V 2%	28480	1902-3214

Page 6-11, Table 6-1, make the following changes and additions:

Delete A3L1, L2.

A3Q10	1854-0215	Tstr SI NPN	04713	SPS3611
A3Q11	1853-0036	Tstr SI PNP	80131	2N3906

CHANGE VI (Continued)

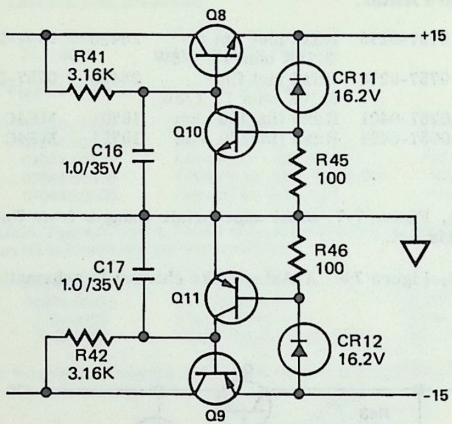
A3R41}	0757-0279	R:Fxd Met Flm 3.16Kohm	28480	0757-0279
A3R42}	1% 1/8W			

A3R45}	0757-0401	R:Fxd Flm 100 ohms	19701	MF4C T-O
A3R46}				

Page 7-4, Figure 7-3, make appropriate change from Parts List to this list.

Page 7-5, Figure 7-4, X-Axis, make changes to schematic as shown:



CHANGE VII (7044A)

Y-AMPLIFIER BOARD

Page 6-9, Table 6-1, make the following changes:

A2C17}	0180-0291	C:Fxd Elec. 1μF	56289	150D105X9035A2-
A2C18}		10% 35 VDCW		DYS
A2CR11}	1902-0202	Diode, Zener	04713	SZ11213.191

Delete A2L1 and A2L2.

Page 6-10, Table 6-1, make the following changes:

A2Q11	1853-0036	TSTR SI PNP	80131	2N3906
A2Q12	1854-0215	TSTR SI NPN	04713	SPS 3611
A2R41}	0757-0279	R:Fxd Met Flm		
A2R42}	3.16KΩ 1% 1/8W		28480	0757-0279

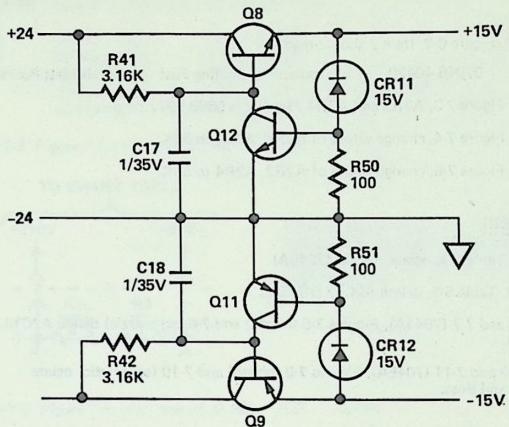
A2R50}	0757-0401	R:Fxd Flm 100Ω	19701	MF4C T-O
A2R51}				

Page 7-6, Figure 7-5, make appropriate changes from Parts List to this list.

Page 7-7, Figure 7-6, make changes to schematic as shown:

CHANGE VII (7044A) (Continued)

Y-AMPLIFIER BOARD



CHANGE VIII (7044A AND 7045A)

Page 6-6, Figure 6-1, Sheet 5, change art as shown:

Page 6-8, Figure 6-1, Sheet 7, delete item numbers 58, 59, and 63. Change part number Item 61 to read: 07040-60030.

Page 6-24, Figure 6-3, Sheet 5, change art as shown.

Page 6-26, Figure 6-3, Sheet 7, delete item numbers 58, 59, and 63. Change part number Item 61 to read: 07040-60030.

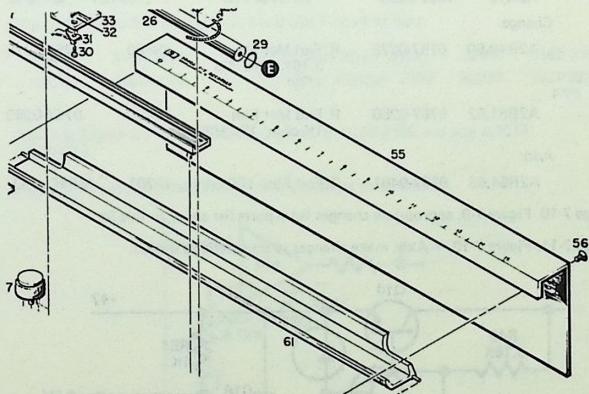
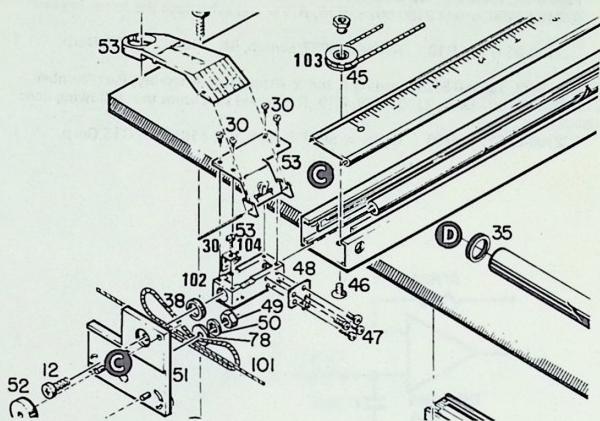


Figure 6-1. Main Frame — Model 7044A (Sheet 5 of 7)

Figure 6-3. Main Frame — Model 7045A (Sheet 5 of 7)

CHANGE IX (7044A AND 7045A)

Page 6-6, Figure 6-1, Sheet 5, change art as shown.



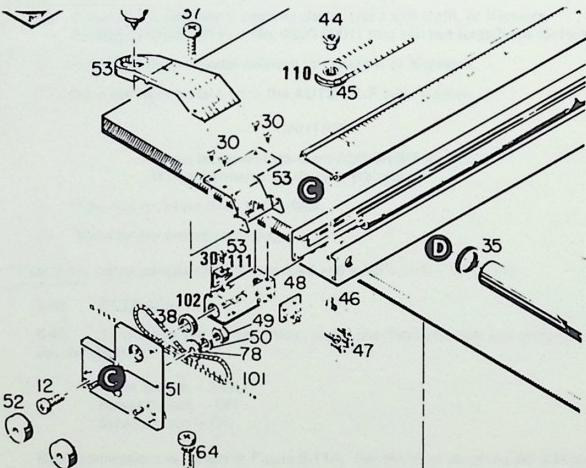
Page 6-8, Figure 6-1, Sheet 7, change Part No. Item 102 to read: 07040-20745.  
Add Item 104 as follows:

104 07046-60440 Wiper Assembly, Y-Axis Hewlett-Packard

Page 6-15, Table 6-2, subheading Electronic Components/Assemblies, after description of 5080-8117, Slidewire Wiper Assembly, add (X-axis). Add the following item:

07046-60440 Slidewire Wiper Assembly (Y-Axis) 1

Page 6-24, Figure 6-3, Sheet 5, change art as shown:



Page 6-26, Figure 6-3, Sheet 7, change Part No. Item 102 to read: 07040-20745.  
Add Item 111 as follows:

111 07046-60440 Wiper Assembly, Y-Axis Hewlett-Packard

Page 6-33, Table 6-5, subheading Electronic Components/Assemblies, after description of 5080-8117, Slidewire Wiper Assembly, add (X-axis). Add the following item:

07046-60440 Slidewire Wiper Assembly (Y-Axis) 1

CHANGE IX (7045A ONLY)

Page 1-1, Paragraph 1-3, line 16 should read: axis from 0.5 mV/in. (0.25 mV/cm) to 10 V/in. (5 V/cm), TTL Remote Control, and a Rear Connector.

Page 1-1, Paragraph 1-3, third and fourth lines from bottom of paragraph, delete TTL Remote Control, and Rear Connector.

Page 1-2, Table 1-1, line after Environmental (Operating), add: TTL REMOTE CONTROL

Operating Levels: Contact closure (0.2 mA) to ground or TTL levels.

Logic (0): Between -0.5 Vdc and +0.4 Vdc.

Logic (1): Between +2.4 Vdc and 5.5 Vdc.

REAR CONNECTOR

Connects Event Marker, X and Y Retransmitting Potentiometers, and TTL.

Provides X and Y inputs and pen lift TTL controls.

Supplies START and RESET remote capability.

TTL and Rear Connector provide Autogrip and Servo Standby capability on Model 7044A. Additionally, X and Y Response on Model 7045A.

Page 1-3, Table 1-2, delete Option 005, TTL; and Option 007, Rear Connector.

Page 1-4, delete paragraphs 1-18, 1-19, 1-22, and 1-23.

Page 1-5, Table 1-3, delete reference to TTL Remote Control — Option 005, and Rear Connector — Option 007.

Page 2-2, delete paragraphs 2-25 and 2-26; and Figure 2-2.

Page 3-3, Figure 3-2, paragraph 4, after Rear Connector, delete — Option 007.

Page 3-4, Figure 3-3, delete — Option 007.

Page 5-14, paragraph 5-71, delete — Option 005.

Page 6-30, Table 6-4, A4, delete Option 005.

Page 6-31, Table 6-4, delete Option 007.

Page 7-12, Figure 7-11, delete — Option 005 from figure title.

This change establishes the Model 7045A as having TTL and Rear Connector as standard features, and deletes Options 005 and 007.

CHANGE X (7044A)

Page 6-11, Table 6-1, A4, delete Option 005.

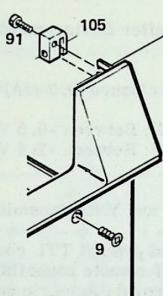
Page 6-13, Table 6-1, delete line reading (Option 007) Rear Connector.

This change establishes the Model 7044A as having TTL and Rear Connector as standard features, and deletes Options 005 and 007. The changes for the Model 7045A deleting references to Options 005 and 007, and making the TTL and Rear Connector standard features also apply to the Model 7044A per Change X.

CHANGE XI

This change incorporates a serviceability improvement for the mainframe casting.

Page 6-6, Figure 6-1 (Sheet 5 of 7). Change the drawing to agree with the following detail:

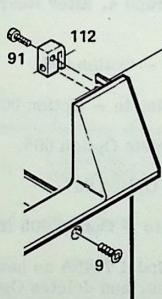


Page 6-8, Figure 6-1 (Sheet 7 of 7). Add the following:

105\* 07046-20002 Hood, Block Hewlett-Packard

\*Installed as needed; not on all instruments.

Page 6-24, Figure 6-3 (Sheet 5 of 7). Change the drawing to agree with the following detail:



Page 6-26, Figure 6-3 (Sheet 7 of 7). Add the following:

112\* 07046-20002 Hood, Block Hewlett-Packard

\*Installed as needed; not on all instruments.

CHANGE XII (7044A)

Page 6-10, Table 6-1, change A2R9 to read as follows:

A2R9 0698-8747 Resistor, 833.3, .1%, .12W 28480 0698-8747

Page 6-11, Table 6-1, change A3R9 to read as follows:

A3R9 0698-8747 Resistor, 833.3, .1%, .12W 28480 0698-8747

Page 7-4, Figure 7-3, change A3R9 part number to 0698-8747.

Pages 7-5 and 7-7, Figures 7-4 and 7-6, X and Y-Axis DC Amplifier Schematic for 7044A, change value of R9 to 833.3.

Page 7-6, Figure 7-5, change A2R9 part number to 0698-8747.

\* CHANGE XIII (7044A AND 7045A)

Page 6-14, Table 6-2, subheading X and Y Attenuator Assembly, Part Number 07046-60150, delete 2100-0978, R10, R:Var and substitute the following line:

2100-3537 R10 R:Var w/SPST Switch, 5K, ±10% CTS Corp. 1

Page 6-32, Table 6-5, subheading X and Y Attenuator Assembly, Part Number 07046-60150, delete 2100-0978, R10, R:Var and substitute the following line:

2100-3537 R10 R:Var w/SPST Switch, 5K, ±10% CTS Corp. 1

*NEGATIVE*X-Y RECORDER FOR SWEPT VARIMACCONTROLS & CONNECTORS located on the X-Y RecorderSWITCHES:

- Line On/Off      Connects line power to the equipment.
- Automatic/  
manual      In "automatic" the frequency dial is motor driven;  
in "manual" it has to be turned by hand.
- Chart hold/  
Release      Auto grip table.
- Servo On/  
Standby      In the "on" position, the recorder will be operating  
either "automatic" or "manual", the "standby" position  
the recorder is off.
- Pen Record/  
Lift      Presses down pen for recording or lifts it for checking  
the operation.
- Sweep      Turns the dial until the end of travel in a certain  
direction, switching it reverses direction.

CONTROLS:

- Zero Y      Adjusts initial position in the "Y" direction.
- Zero X      Adjusts initial position in the "X" direction.
- X Amplitude      Adjusts and positions in the "X" direction.

CONNECTORS:

- 3 Pin      Delivers the AC line power to drive the motor in the  
Varimac detector chassis.

Phono Jacks:

- "X"      Input to servo amplifier "X" from Varimac detector.
- "Y"      Input to servo amplifier "Y" from Varimac detector.

CONNECTORS located on the Varimac Detector Chassis

3 Pin

Supplies the AC line power to drive the motor in the Varimac detector chassis.

2 Pin

"X"

Output of the horizontal component on the scope display.

"Y"

Output of the vertical component on the scope display.

"Z"

Amplitude of the vector  $Z = \sqrt{y^2 + H^2}$ . Can be applied to the 'Y' jacks on the X-Y recorder.

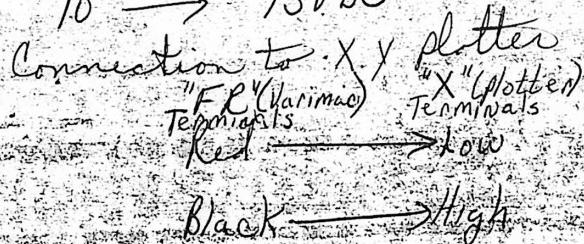
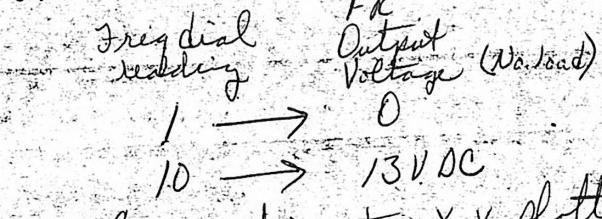
"FR"

The DC signal from the frequency sweep to be applied to the 'X' phono jacks on the X-Y recorder. The frequency sweep will now deflect the pen in the horizontal direction.

CONNECTORS located on Varimac II Chassis

One pair of jacks delivers a DC signal proportional to the output power of the Varimac II.

Should be variable from 0 to +13 VDC  
on "FR" terminals without a load.



## X-Y RECORDER FOR SWEPT VARIMAC

Read carefully all the instruction before using the equipment.

### OPERATION

- A) The equipment can be operated in different modes.

As on X-Y plotter - connect "x" to 'X' and 'Y' to 'Y'.

For FREQUENCY V/S separation connect 'X' on Recorder to 'FR' on detector chassis and 'Y' on Recorder to 'Z' on detector chassis.

The frequency change moves the pen in the "x" direction. This movement can be "automatic" or "manual" depending on the switch position. The speed in manual should be slow to avoid false indications. The manual drive is very useful for identifying discrete frequencies on the chart. No movement is possible for servo in the "Standby" position. The servo switch should be set into the "on" position after all other controls are properly adjusted. The length of the recordings is adjustable by means of the "x" amplitude to suit the paper used for recordings.

### PRINCIPLES OF OPERATION

The vector signal which controls the "Y" movement of the recorder is  $3 = \sqrt{V^2 + H^2}$ . It is characteristic for this output that the signal will always be proportional to the absolute value of the indication (vector) regardless of phase, but only at the frequency where the reference piece is balanced to zero (center point on the scope.) At this frequency, the phase information will be lacking. In order to retain the phase information, it is recommended that the balance of the equipment is set up in such a way - while sweeping the frequency range - that the dot on the scope does not come too close to the center of the screen at any frequency. In practice, this means to adjust the balance to have the dot on the bigger circle.

The same test pieces - balanced at different frequencies before sweeping - will have somewhat different recordings, but the best frequencies for separation will be identifiable.

## X-Y RECORDER FOR SWEPT VARIMAC

Read carefully all the instruction before using the equipment.

### OPERATION

- A) The equipment can be operated in different modes.

As on X-Y plotter - connect "x" to 'X' and 'Y' to 'Y'.

For FREQUENCY V/S separation connect 'X' on Recorder to 'FR' on detector chassis and 'Y' on Recorder to 'Z' on detector chassis.

The frequency change moves the pen in the "X" direction. This movement can be "automatic" or "manual" depending on the switch position. The speed in manual should be slow to avoid false indications. The manual drive is very useful for identifying discrete frequencies on the chart. No movement is possible for servo in the "Standby" position. The servo switch should be set into the "on" position after all other controls are properly adjusted. The length of the recordings is adjustable by means of the "X" amplitude to suit the paper used for recordings.

### PRINCIPLES OF OPERATION

The vector signal which controls the "Y" movement of the recorder is  $3 = \sqrt{V^2 + H^2}$ . It is characteristic for this output that the signal will always be proportional to the absolute value of the indication (vector) regardless of phase, but only at the frequency where the reference piece is balanced to zero (center point on the scope.) At this frequency, the phase information will be lacking. In order to retain the phase information, it is recommended that the balance of the equipment is set up in such a way - while sweeping the frequency range - that the dot on the scope does not come too close to the center of the screen at any frequency. In practice, this means to adjust the balance to have the dot on the bigger circle.

The same test pieces - balanced at different frequencies before sweeping - will have somewhat different recordings, but the best frequencies for separation will be identifiable.

N/C

10-73

388

CONNECTORS located on the Varimac Detector Chassis

3 Pin

Supplies the AC line power to drive the motor in the Varimac detector chassis

2 Pin

"X" Output of the horizontal component on the scope display.

"Y" Output of the vertical component on the scope display.

"Z" Amplitude of the vector  $Z = \sqrt{V^2 + H^2}$ . Can be applied to the 'Y' jacks on the X-Y recorder.

"FR" The DC signal from the frequency sweep to be applied to the 'X' phono jacks on the X-Y recorder. The frequency sweep will now deflect the pen in the horizontal direction.

CONNECTORS located on Varimac II Chassis

One pair of jacks delivers a DC signal proportional to the output power of the Varimac II.

N/C

MAGNETIC ANALYSIS CORPORATION

X-Y RECORDER FOR SWEPT VARIMAC

CONTROLS & CONNECTORS located on the X-Y Recorder

SWITCHES:

- Line On/Off Connects line power to the equipment.
- Automatic/  
manual In "automatic" the frequency dial is motor driven;  
in "manual" it has to be turned by hand.
- Chart hold/  
Release Auto grip table.
- Servo On/  
Standby In the "on" position, the recorder will be operating  
either "automatic" or "manual", the "standby" position  
the recorder is off.
- Pen Record/  
Lift Presses down pen for recording or lifts it for checking  
the operation.
- Sweep Turns the dial until the end of travel in a certain  
direction, switching it reverses direction.

CONTROLS:

- Zero Y Adjusts initial position in the "Y" direction.
- Zero X Adjusts initial position in the "X" direction.
- X Amplitude Adjusts and positions in the "X" direction.

CONNECTORS:

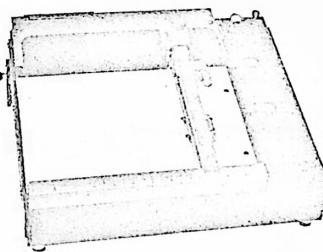
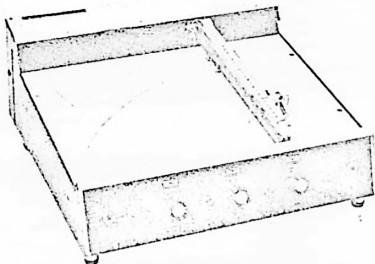
- 3 Pin Delivers the AC line power to drive the motor in the  
Varimac detector chassis.
- Phono Jacks:
- "X" Input to servo amplifier "X" from Varimac detector.
- "Y" Input to servo amplifier "Y" from Varimac detector.

**TWO PEN X-Y<sub>1</sub>, Y<sub>2</sub>**  
**Simultaneous plotting of three parameters**  
**Models 2FA and 136A**

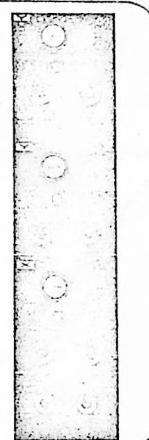
The 2FA and 136A are two-pen X-Y<sub>1</sub>, Y<sub>2</sub> graphic recorders available with English or Metric scaling for bench or rack mounting. Features include a built-in time base on the X axis with 5 calibrated sweeps, 11 input voltage ranges with a continuous vernier that scales input voltages to fit the paper, a full-scale zero set and suppression, local and remote pen lift and potentiometric inputs. Two-pen capability makes these recorders extremely useful for plotting 3 parameters simultaneously.

The two pens traverse the full X axis with no more than 0.1 inch horizontal separation. The servo drives are independent and free of electrical ground. The servo amplifiers and power supplies are combined in a single compact modular unit. A simplified self-balancing system using linear slidewires and a continuous zener-controlled reference provides for non-interacting and accurate recording versatility. Autogrip electric paper holdown provides a positive grip on chart paper up to the size of the platen. Operation is silent and maintenance free.

2FA Series  
11 in. x 17 in.



136A Series, 8½ in. x 11 in.



### Specifications

#### Performance Specifications

**Input ranges:** 0.5, 1, 5, 10, 50 mV/in.; 0.1, 0.5, 1, 5, 10, 50 V/in.  
 Metric models: 0.2, 0.5, 2, 5, 20, 50 mV/cm; 0.2, 0.5, 2, 5, 20 V/cm. Variable range mode all positions.

**Input resistance:** one megohm at null on all fixed ranges. Variable range mode, 100,000 ohms on four most sensitive ranges and one megohm on all others. On the Model 2FA, potentiometric input is available on the four most sensitive ranges of each axis by removing an internal strap. On the Model 136A, potentiometric input is available on the four most sensitive ranges of the X-axis by removal of an internal strap and on both Y axes by a front panel switch.

**Maximum allowable source impedance:** up to 10 kΩ source impedance will not alter recorder's performance on the four lowest ranges. No source impedance restrictions on ranges above 10 mV/in.

**Time Sweeps:** (on X axis only) 0.5, 1, 5, 10, 50 s/in.; metric: 0.2, 0.5, 2, 5, 20 s/cm. Accuracy, 5% of full scale.

**Accuracy:** 0.2% of full scale.

**Linearity:** 0.1% of full scale.

**Resetability:** 0.1% of full scale on all ranges.

**Reference stability:** better than 0.002%/°C.

**Slewing speed**

**2FA series:** 60 Hz operation: 10 in./s (25 cm/s) on the X-axis; 20 in./s (50 cm/s) on Y<sub>1</sub> and Y<sub>2</sub> axes max. 50 Hz operation: 8 in./s (20 cm/s) on the X-axis; 16 in./s (40 cm/s) on Y<sub>1</sub> and Y<sub>2</sub> axes max.

**136A/AM:** 60 Hz operation: 20 in./s (50 cm/s) on the X-axis; 15 in./s (38 cm/s) on Y<sub>1</sub> and Y<sub>2</sub> axes max. 50 Hz operation: 16 in./s (40 cm/s) on the X-axis; 12 in./s (30 cm/s) on the Y<sub>1</sub> and Y<sub>2</sub> axes max.

#### General Specifications

**Paper holdown:** Autogrip paper holdown electronically grips charts of any size up to size of platen.

**Pen lift:** local and remote.

**Power:** 115 or 230 V, 50 or 60 Hz, 130 VA.

**Dimensions:** 2FA/2FAM (bench): 18½" deep, 17½" wide, 8½" high (464 x 445 x 206 mm); 2FRA/2FRAM (rack): 8" deep, 19" wide, 19-7/32" high (203 x 483 x 488 mm); 136A/AM (bench): 14" high, 17½" wide, 6-3/16" deep (355 x 454 x 157 mm); (rack) 14" high, 19" wide, 6-3/16" deep (355 x 483 x 157 mm).

**Weight:** 2FA series: net, 42 lb (18.9 kg); shipping, 55 lb (24.75 kg). 136A/AM: net, 34 lb (15.45 kg); shipping, 47 lb (21.3 kg).

**Price:** 2FA/2FRA (English), 2FAM/2FRAM (Metric) \$3450  
 136A/136AR (English), 136AM/136AMR (Metric) \$2750

#### Options

2FA Option Number	136A Option Number	Description	Price
01	02	Rear input connectors (supplied with mating connectors)	add \$15
02	—	Event marker	add \$100
—	03	5 kΩ retransmitting potentiometer-X axis	add \$100
03	04	Disposable pen tips	N/C

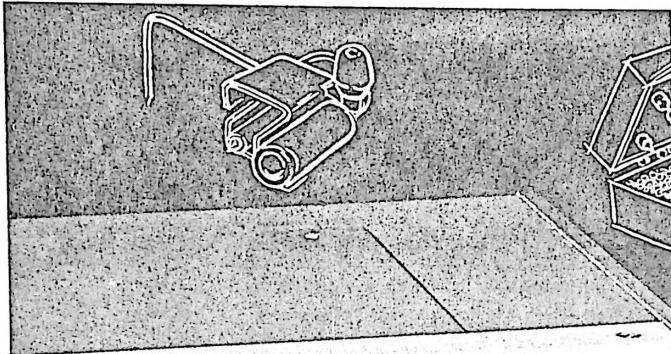
10/73

388

HEWLETT  PACKARD

SERVO RECORDER SUPPLIES  
GRAPH PAPER, PENS, AND INKS

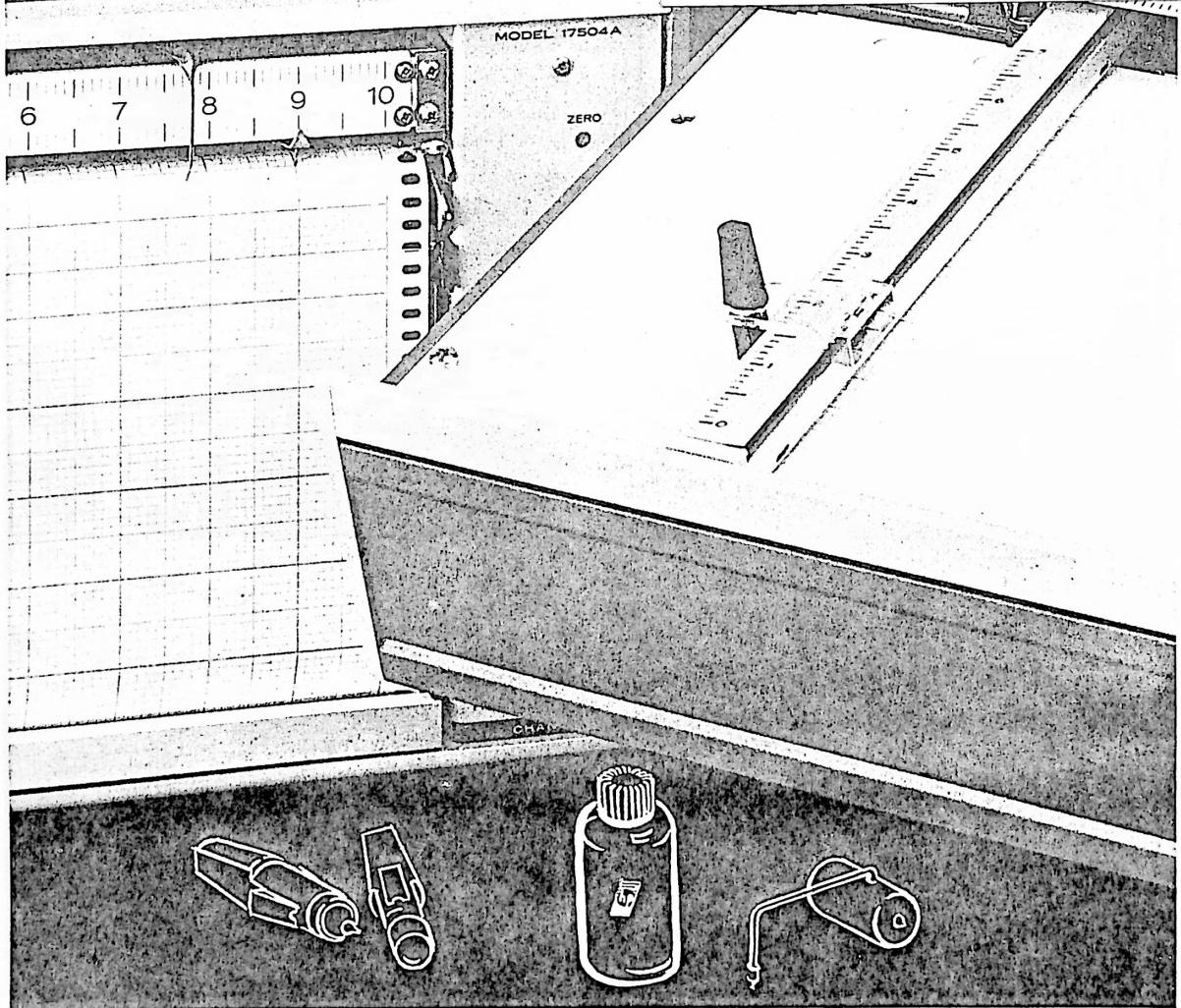
TECHNICAL DATA APRIL 1971



BILL LEWIS  
*Electronics Field Engineer*

(313) 476-6400  
23855 RESEARCH DRIVE  
FARMINGTON HILLS, MICHIGAN 48024

HEWLETT  PACKARD  
MIDWEST SALES REGION



## **STRIP CHART RECORDER PAPERS**

STRIP CHART RECORDER PAPERS		Type	Grid Description		Weight	Part No.	Price
			Variable Axis	Time Axis			
680 7143A/B		Linear, English Semi-Log Blank, English Linear, Metric	5 major div (1 in. ea) 3 cycle log (5 in.) No grid 12 major div (1 cm ea)	1 in. major div (95 ft) 1 in. major div (95 ft) No grid (120 ft) 1 cm major div (28.5 m)	Light Light Light Light	9270-1012 9280-0138 9270-1061 9270-1025	2.10 4.50 5.00 2.50
				ELECTRIC WRITING			
		Linear, English Semi-Log Linear, Metric	10 major div (1 in. ea) 3 cycle log (5 in.) 12 major div (1 cm ea)	1 in. major div (65 ft) 1 in. major div (65 ft) 1 cm major div (19.5 m)	-- -- --	9280-0136 9280-0134 9270-1081	4.90 7.50 4.90
7100B/7101B 7127A/7128A		Linear, English  Right Soft Zero  Integrator, English Blank, English Linear, Metric Blank, Metric	10 major div (1 in. ea)  15 major div ( $\frac{2}{3}$ in. ea) 20 major div ( $\frac{1}{2}$ in. ea) 25 major div ( $\frac{2}{5}$ in. ea) 10.5 major div ( $\frac{20}{21}$ in. ea) 10.5 major div ( $\frac{17}{21}$ in. ea) 1 in. grid for integrator No grid 25 major div (1 cm ea) No grid	1 in. major div (120 ft)  1 in. major div (120 ft) 1 in. major div (120 ft) No grid (120 ft) 1 cm major div (36 m) No grid (36 m)	Light Heavy Light Light Light Light Light Light Light	9270-1010 9270-1011 9270-1067 9270-1065 9270-1066 9280-0131 9270-1072 9270-1062 9270-1037 9280-0139	3.25 3.25 3.15 4.50 3.15 3.25 3.25 4.50 3.25 6.50
				ELECTRIC WRITING			
		Linear, English Right Soft Zero Linear, Metric	10 major div (1 in. ea) 10.5 major div ( $\frac{20}{21}$ in. ea) 25 major div (1 cm ea)	1 in. major div (100 ft) 1 in. major div (100 ft) 1 cm major div (30 m)	-- -- --	9270-1078 9280-0170 9270-1082	7.90 7.90 7.90
7123A/B		Linear, English Right Soft Zero Linear, Metric Integrator, English Integrator, Metric	10 major div (1 in. ea) 10.5 major div ( $\frac{20}{21}$ in. ea) 25 major div (1 cm ea) 10.5 major div ( $\frac{17}{21}$ in. ea) 1 in. grid for integrator 21 major div (1 cm ea) 1 in. grid for integrator	1 in. major div (95 ft) 1 in. major div (95 ft) 1 cm major div (28.5 m) 1 in. major div (95 ft) 1 cm major div (28.5 m)	Light Light Light Light Light	9280-0175 9280-0222 9280-0176 9280-0189 9280-0188	3.25 3.25 3.25 3.25 3.25
				ELECTRIC WRITING			
		Linear, English Right Soft Zero Linear Metric	10 major div (1 in. ea) 10.5 major div ( $\frac{20}{21}$ in. ea) 25 major div (1 cm ea)	1 in. major div (65 ft) 1 in. major div (65 ft) 1 cm major div (19.5 m)	-- -- --	9280-0177 9270-0842 9280-0178	7.00 7.00 7.00

**Quantity Discounts Available**

338

Hewlett-Packard recorder inks, papers, and supplies are specifically designed to insure precision plotting of data. Characteristics such as ink drying and paper stability are carefully controlled.

Hewlett-Packard graph paper is precision printed in light green on white stock. Printing is done under controlled conditions at 50% relative humidity to minimize change over the normal humidity range. Margins on X-Y paper are carefully controlled for both

width and parallelism so that sheet after sheet can be accurately registered in the recorder.

Permanent, crisp, continuous traces are produced by Hewlett-Packard recording inks, pens, and electric styli. Measurements requiring continuous, permanent recordings can be made with confidence.

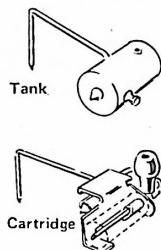
When ordering supplies, please specify the quantity, HP part number, and your instrument model number.

X-Y RECORDER PAPERS	Type	Grid Description		Weight	Part No.	Price (Per 100 Sheet Box)
		X	Y			
8½ in. X 11 in. (21.6 cm X 28 cm)	Linear, English	10 major div (1 in. ea)	7 major div (1 in. ea)	Light	9270-1007	3.50
	Linear, Metric	25 major div (1 cm ea)	18 major div (1 cm ea)	Heavy	9270-1006	3.00
	Smith Chart	7-inch diameter		Light	9270-1027	3.75
	Wave Analyzer	For applications using HP Models 3590A and 3591A. 7-inch diameter		Heavy	9270-1023	4.00
				Light	9280-0137	3.00
				Heavy	9280-0161	4.00
11 in. X 16½ in. (28 cm X 41.9 cm)	Linear, English	15 major div (1 in. ea)	10 major div (1 in. ea)	Light	9270-1005	4.50
	Linear, Metric	38 major div (1 cm ea)	25 major div (1 cm ea)	Heavy	9270-1004	4.50
	Semi-Log	2 cycle (15 in.) 3 cycle (15 in.) 15 major div (1 in. ea)	10 major div (1 in. ea)	Light	9270-1042	4.50
	Log-Log	15 major div (1 in. ea)	10 major div (1 in. ea)	Heavy	9270-1024	4.50
	Blank (Scaling points in non-repro blue)	3 cycle (15 in.) 2 cycle (15 in.) 4 cycle (13.33 in.)	2 cycle (10 in.) 3 cycle (10 in.) 3 cycle (10 in.)	Heavy	9280-0159	4.90
		Scaling points at 0 in., 10 in., and 15 in.	Scaling points at 0 in. and 10 in.	Heavy	9280-0160	4.90
				Heavy	9280-0169	4.90
				Heavy	9280-0168	4.90
				Heavy	9280-0167	4.90
				Heavy	9280-0165	4.90
				Heavy	9280-0171	4.90
				Heavy	9280-0180	4.90
English	Metric					
English	Metric					
English	Metric					
English	Metric					
English	Metric					
English	Metric					
English	Metric					
English	Metric					
X-Y ROLL CHART PAPERS	Type	Grid Description		Form	Part No.	Price
17005A	Frame, English	15 major div (1 in. ea) 9 in. between frames	10 major div (1 in. ea)	roll	9280-0121	4.50
	Frame, Metric	38 major div (1 cm ea) 22 cm between frames	25 major div (1 cm ea)	fan-fold	9280-0126	11.50
	Continuous Grid, English	1 in. major div (120 ft)	10 major div (1 in.)	roll	9280-0122	6.00
	Continuous Grid, Metric	1 cm major div (36 cm)	25 major div (1 cm ea)	fan-fold	9280-0125	11.50
				roll	9270-1017	3.25
				fan-fold	9280-0123	6.00
				roll	9270-1083	4.50
				fan-fold	9280-0124	6.00

Quantity Discounts Available

133 Cleaning Wire 11441 - 015126  
SYRINGE 17999-09423

## PENS & PEN ASSEMBLIES



	Recorder	Pen Type	PERMANENT TIP		DISPOSABLE TIP	
			Part Number	Price	Part Number	Price
	2FA/136A	Tank Y <sub>1</sub>	17999-10282	10.50	5080-7733	6.60
		Y <sub>2</sub>	17999-18382	14.00	5080-7736	11.50
	135/135A	Tank	17999-10282	10.50	5080-7733	6.50
	7000A/7001A	Cartridge	17999-13249	16.00	5080-7738	12.50
	7005B*	Tank	17999-10282	10.50	5080-7733	6.50
	7030A	Cartridge	17999-13249	16.00	5080-7738	12.50
	7035B*	Tank	07035-80630	9.50	07035-80070	7.00

\* Early 7005B and 7035B X-Y Recorders were equipped with tank type pens. A conversion kit is available to allow use of disposable type pens.

## DISPOSABLE PENS



## CONVERSION KITS (To Disposable Pens)

Recorder	Color	Part Number	Price (per 3)	Recorder		Part Number	Price
7004B		5081-1190		7004A	English	07004-81420	25.00
7005B*	Red	5080-7979	4.50		Metric	07004-81430	25.00
7034A	Blue	5080-7980	4.50	7005A/B	English	07004-81420	25.00
7035B*	Green	5080-7981	4.50		Metric	07004-81430	25.00
7200A	Black	5080-7994	4.50	7035A/B	English	07035-80840	25.00
9125A/B					Metric	07035-80850	25.00

\* Early 7005B and 7035B X-Y Recorders were equipped with tank type pens. A conversion kit is available to allow use of disposable type pens.

## DISPOSABLE PEN TIPS

Capillary Tip



Fiber Tip



LOW SPEEDS

Capillary Tip



Fiber Tip



## MODELS

All X-Y's and Strip Charts except as noted

## DESCRIPTION

Capillary SLOW

Fiber\* FAST

## HP PART NO.

5080-3655

5080-3654

## PRICE (BOX OF 5)

3.00

3.00

## MODELS

7101B, 7127A and lower pen of 7100B, 7128A

## DESCRIPTION

Capillary

Fiber

## HP PART NO.

07100-82360

07100-82350

## BOX OF 5

4.00

4.50

\*Not recommended for 7123A/B or 7143A/B

## RECORDING INKS

### X-Y Recorders

## Strip Chart Recorders

## MODEL

## DESCRIPTION

## COLOR

## HP PART NO.

## PRICE

For all X-Y

Recorder

tank or

cartridge

type pens

2 oz. bottle

for tank

refill

Red

1530-1031

1.00

680, 7100B

7101B,

7127A,

7128A

Red

1530-1024

.50

.77 cc

replaceable

cartridge

Green

1530-1027

.50

Green

1530-1025

.50

Black

1530-0981

.50

Black

1530-0705

.50

Blue

1530-1028

.50

Blue

1530-1034

.50

Purple

1530-0982

.50

Purple

1530-0984

.50

MAGNETIC ANALYSIS CORPORATION

July 20, 1973

TO: Jim Brooks  
FROM: Bill Hulle  
REF: SAGINAW X-Y PLOTTER

Enclosed see Dwg. 3A-503A, for mechanical assembly of motorized Varimac variable capacitor, consisting of items 1 - 11.

Disassembly of unit I believe is self-explanatory. However, it is not suggested unless absolutely necessary.

As you can see from it's operation, item 1 continues to rotate when capacitor is up against it's stops in either direction. This is accomplished by means of a slip clutch produced by axial pressure to item 1 forcing the hub of this gear against the locking collar of the capacitor. Pressure is provided by 3 bowed springs, item 11, and retained and adjusted by the flexible coupling, item 2.

One word of caution, item 2 is retained to the ceramic shaft of the capacitor by two set screws. Overtightening of these screws could crack or even break this shaft. Future models, if any, will have a steel sleeve expoxied to the ceramic shaft to avoid this problem.

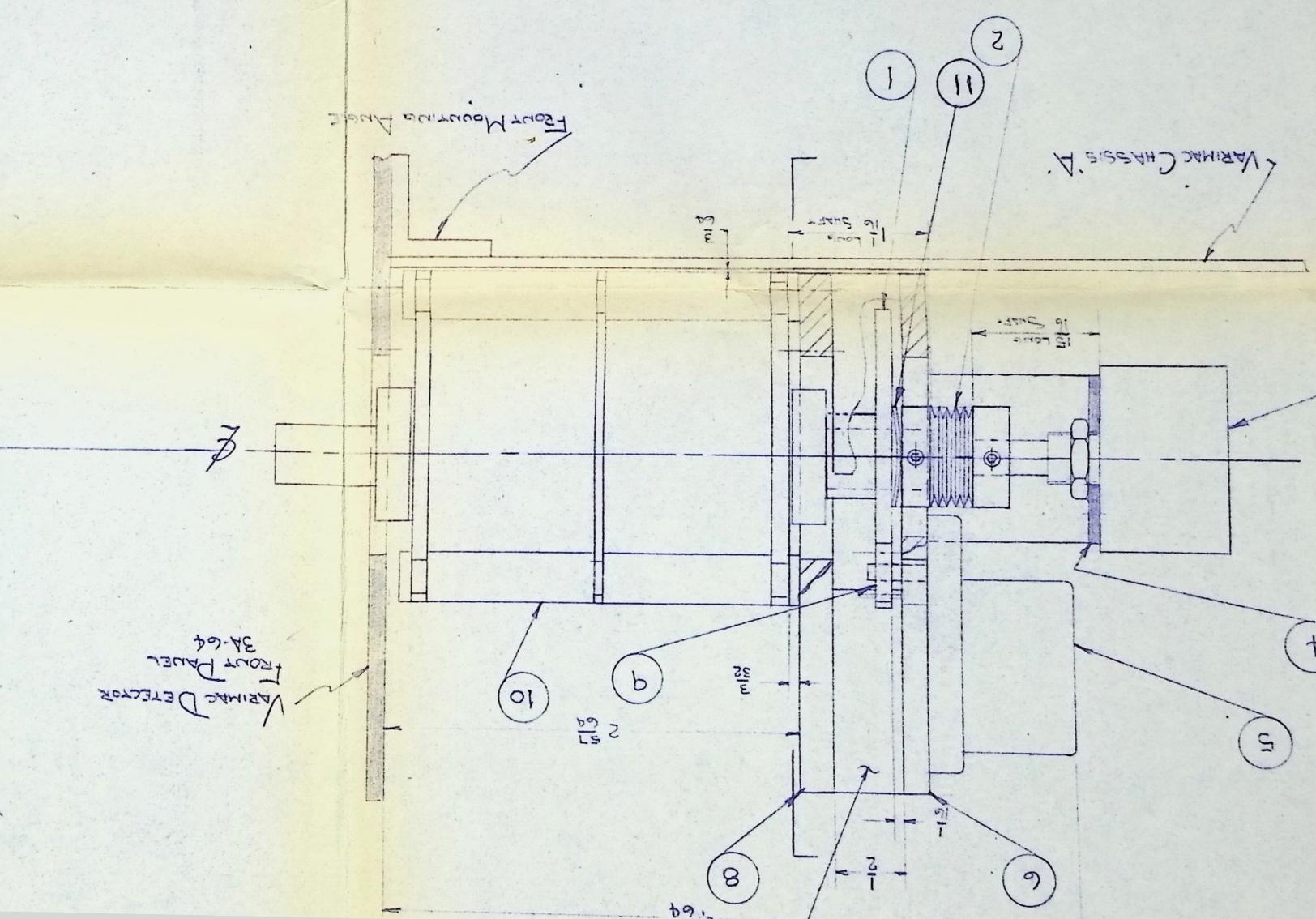
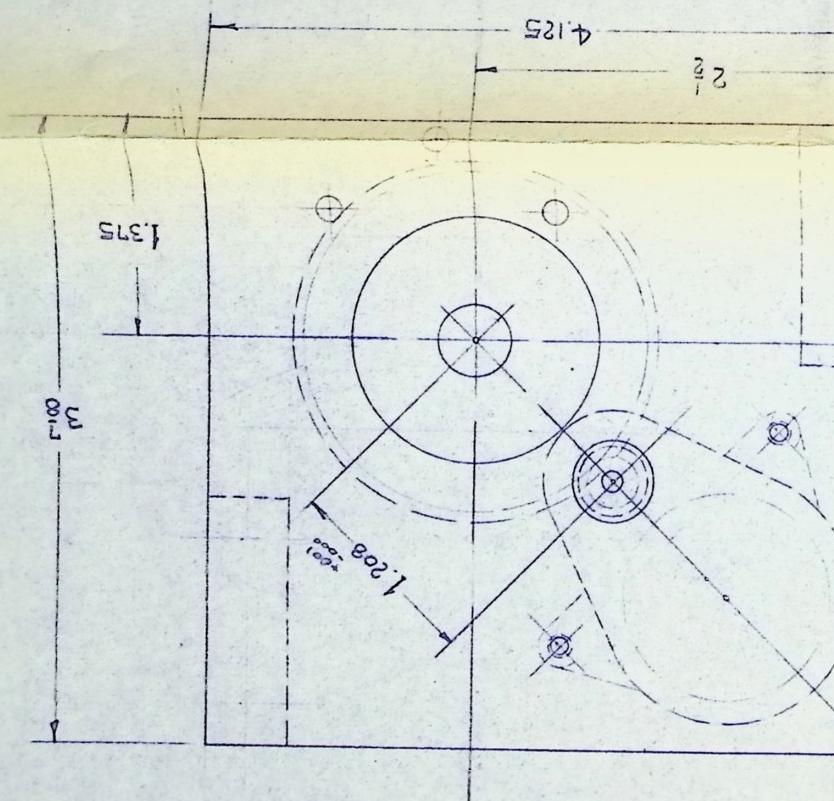
Any questions, call,

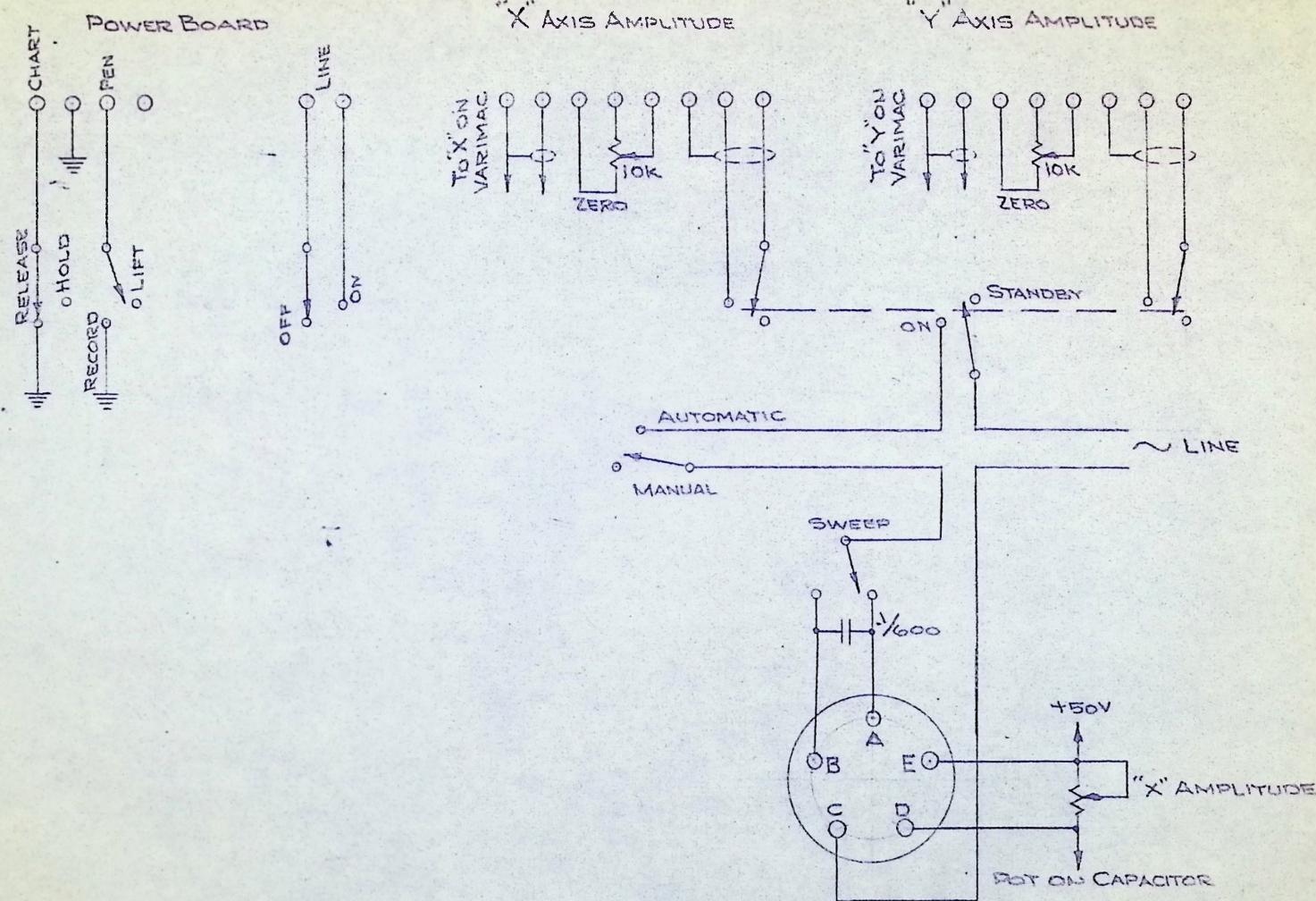
Bill Hulle

BH/cd

cc: wsg  
jdw  
pjs  
feb  
file

1	Large Spring GE-12	3A-504	Large Assembly GE-12
2	Coupling	3A-505	FREQUENCY SWITCH TOL FRAC ± 1000 DEC ± 000
3	Pot	~	Capacitor #140-8
4	Cap-Bucket	3A-506	0.080 ALUM CORRECTION
5	Motor	~	HARDEN 81316
6	Motor Rate	3A-507	3/16 ALUM 3 7/8 x 4 1/8
7	Spacer	3A-508	1/2 ALUM x 1/2
8	Fence Plate	3A-509	1/4 ALUM x 3 1/8 x 4 1/8
9	Shall Support	~	Boston C-132
10	Gauge Capacitor	~	JACKSONS 5140-8
11	Bowden Spring	~	ASSOC. SPRING U437-0120



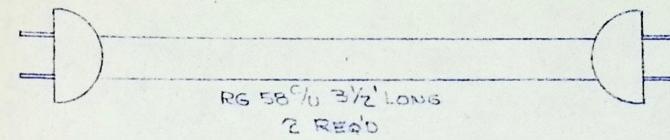
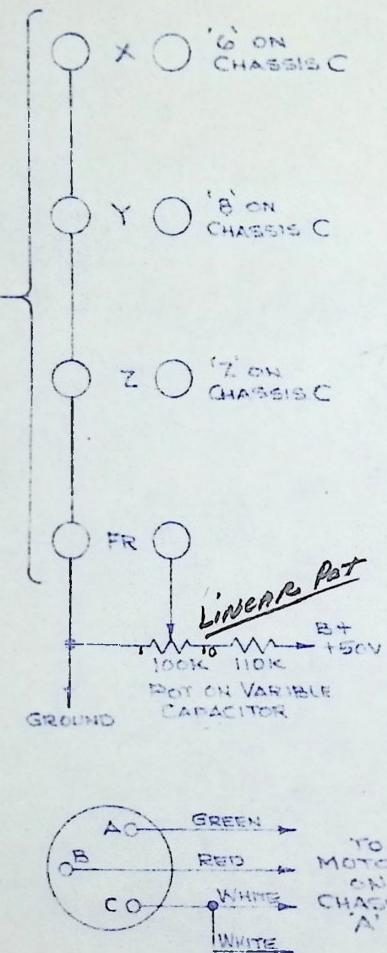


MAGNETIC ANALYSIS CORPORATION,  
 DRAWN W.A.B "X" & "Y" RECORDER  
 (VARIMAC SPECIAL)  
 SCALE ~  
 DATE 7-24-73 FOR SAGINAW CONTROL WIRING

310-125

CKD I.G.

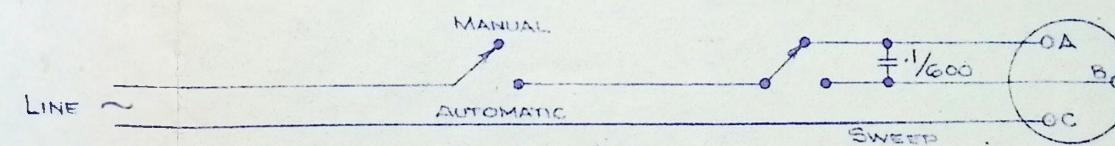
CONNECTIONS ON REAR PANEL  
VARIMAC DETECTOR, SECTION A



GENERAL 274-MB  
ELECTRIC  
2 REQ'D

MS#106A145-TP  
2 REED

CONNECTING CABLES



ADDITIONAL WIRING ON "X"- "Y" RECORDER

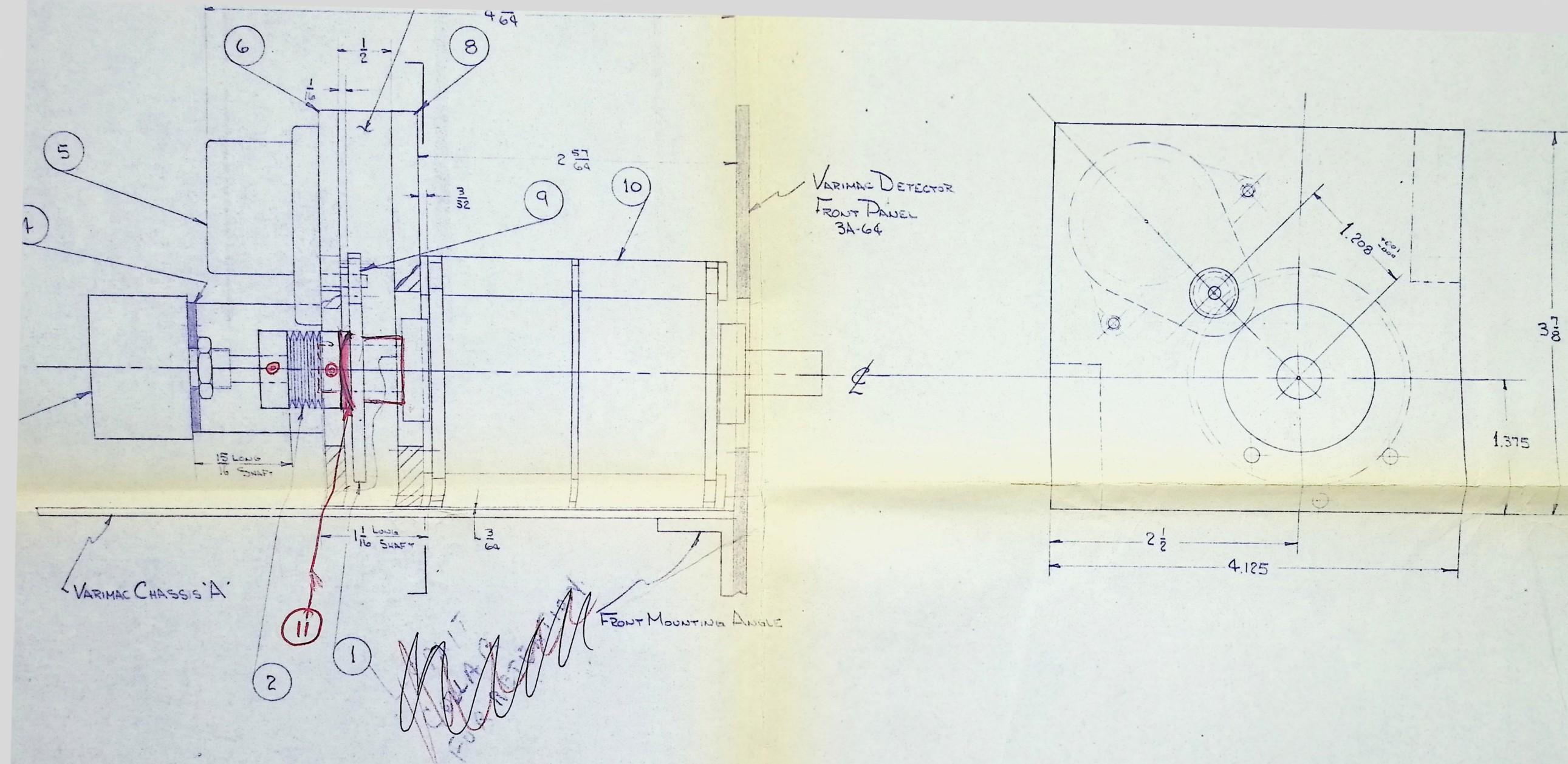
DECEIVE  
5-24-76

W.A.B. "X"- "Y" RECORDER FOR  
VARIMAC I & II

10-31-76

3W-139

CKD 1.G.



#	BOWED SPRING	~	3 ASSOC. SPRINGS. U437-0100
10	GANG CAPACITOR	~	JACKSONS 5140-2
9	SMALL SPUR GEAR	~	1 BOSTON G132
8	FRONT RATE	3A-509	1 $\frac{1}{4}$ ALUM $\times$ $3\frac{1}{8} \times 4\frac{1}{8}$
7	SPACER	3A-508	2 $\frac{1}{2} \times \frac{1}{2}$ ALUM $\times \frac{1}{2}$
6	MOTOR RATE	3A-507	1 $\frac{3}{16}$ ALUM $\times 3\frac{7}{8} \times 4\frac{1}{8}$
5	MOTOR	~	HAYDEN 81316
4	POT BRACKET	3A-506	1 .080 ALUM.
3	POT	~	1 CLAROSTAT #140-6520
2	COUPLING	3A-505	1 ECONAVI #W3-SC66-26006
1	LARGE SPUR GEAR	3A-504	1 BOSTON G154 - REWORKED

MAGNETIC AN  
VARIMAC Moto  
FREQUENCY 5  
ASSEMBLY  
FULL  
 $\sqrt{6}$

# OPERATION AND SERVICE MANUAL

## NOTICE

PLEASE CHECK CARTON AND ENVELOPE FOR MANUALS AND ACCESSORIES.

IF THE ADDRESS ON THIS CARTON IS LOST OR BECOMES ILLEGIBLE DURING SHIPMENT, CONTACT THE NEAREST SALES OFFICE LISTED ON THIS ENVELOPE.

## ATTENTION

VERIFIEZ LA PRÉSENCE DES MANUELS ET DES ACCESSOIRES DANS L'EMBALLAGE ET DANS L'ENVELOPPE.

SI L'ADRESSE DE CET EMBALLAGE A ÉTÉ PERDUE DURANT LE TRANSPORT OU EST DEVENUE ILLISIBLE, CONTACTEZ LE PLUS PROCHE DES BUREAUX DE VENTE INDIQUES SUR CETTE ENVELOPPE.

## ACHTUNG

BITTE ÜBERPRÜFEN SIE OB DIE BEDIENUNGSLEITUNG UND ALLE ZUBEHÖRTEILE VORHANDEN SIND.

SOLLTE DIE ADRESSE AUF DIESEM KARTON ABHANDEN GEKOMMEN SEIN, SO WENDEN SIE SICH BITTE AN DAS ZUSTÄNDIGE VERKAUFSBÜRO, DAS AUF DEM UMSCHLAG ANGEgeben IST.

## AVISO

POR FAVOR VERIFIQUE LA EXISTENCIA DE MANUALES Y ACCESORIOS EN LA CAJA Y EN EL SOBRE.

SI LA DIRECCION DE ESTA CAJA SE EXTRAVIARA O LLEGARA A SER ILEGIBLE EN TRANSITO PONGASE EN CONTACTO CON LA OFICINA DE VENTAS MAS CERCANA, CUYA DIRECCION APARECE EN ESTE SOBRE.

## EASTERN U.S.

Hewlett-Packard Co.  
Customer Service  
West 120 Century Road  
Paramus, New Jersey 07652  
Tele: (201) 265-5000  
TWX: 710-990-4951  
Telex: 134-433

## WESTERN U.S.

Hewlett-Packard Co.  
Traffic Dept.  
1601 California Ave.  
Palo Alto, California 94304  
Tele: (415) 493-1311  
TWX: 910-373-1267  
Telex: 348-461

## EUROPE

Hewlett-Packard S.A.  
7, rue du Bois-du-Lan  
CH-1217 Meyrin 2—Genève  
Switzerland  
Tele: (022) 41 54 00  
Telex: 27333 hpsa ch  
Cable: HEWPACKSA Geneva

## FAR EAST (except Japan)

Hewlett-Packard  
P.O. Box 87  
Alexandra Post Office  
Singapore 3  
Tele: 633022  
Cable: HEWPACK Singapore

## JAPAN

Yokogawa - Hewlett-Packard Ltd.  
Ohashi Building  
1-59-1 Yoyogi  
Shibuya-ku, Tokyo, Japan  
Tele: 03-370-2281/7  
Telex: 232-2024 YHP  
Cable: YHPMARKET TOK 23 724

## ELSEWHERE

Hewlett-Packard Intercontinental  
3200 Hillview Avenue  
Palo Alto, California 94304  
Tele: (415) 493-1501  
TWX: 910-373-1260  
Telex: 034-8300, 034-0493  
Cable: HEWPACK Palo Alto

To CLEAN TABLE

50% ISOPROPYL ALCOHOL

50% WATER

ONLY

Model 7044A Serial 1614AO  
1701